JUL 4 1898

THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. JUYL 7, 1898. CHICAGO, ILL. NUMBER 27

IS BETTER THAN THE BEST BELT DRESSING AND MUCH MORE.

CLING-SURFACE

CLING-SURFACE MFG. CO., 10 Court St., Buffalo.

AN IDEAL BELT

Made possible by Cling-Surface.

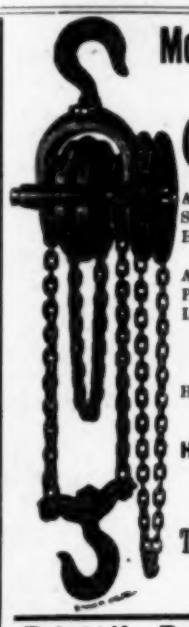
E. O. PRICE COKE CO.,

Post Office, PITTSBURG, PA.

Mines and Ovens in the Connellsville Coke Region, Penna.

Headquarters for..... GENUINE CONNELLSVILLE COKE

For Blast Furnaces and Foundry Cupola Work; also Crushed Connellsville Coke (substitute for Anthracite Coal) for manufacturing and domestic purposes. 13,500 Ovens. Daily Capacity 30,000 tons of Coke. Direct connections with all Railroads entering the Region. Quotations, Freight Rates, Pamphlets giving full information, promptly furnished on application.



Moore's Anti-Friction DIFFERENTIAL CHAIN HOIST.

Adjustable Automatic Brake. Self sustaining at every point. Highest Efficiency

A New Movement. A Perpetual Compound Lever. Powerful, Simple and Durable. Light, Compact and Strong.

NINE SIZES.

Half Ton to Ten Tons Capacity.

ALSO

HAND POWER CRANES, WINCHES, &c.

THE CHISHOLM & MOORE MFG. CO.

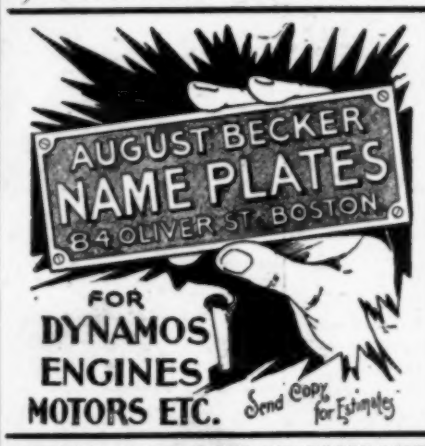
CLEVELAND, O.

Bristol's Patent Steel Belt LACING.

Most Perfect fastening for all kinds of Belting. Samples free.

THE BRISTOL CO., Waterbury, Conn.

IT PAYS to advertise in The Iron Trade Review.



FORSTER, WATERBURY & CO.,

INCORPORATED.

PIG IRON, STEEL, ORE, COKE.

636-638 Rookery, CHICAGO.

DICKMAN & MACKENZIE,

CLEVELAND, 71 Atwater Bldg. CHICAGO, 1224 Rookery Bldg.

Mining properties examined. Ores sampled at mines, furnaces and all lake ports. General analyses of Ores, Slags, Metals, Fuel Foundry Materials and Products, etc.

CHEMISTS AND ENGINEERS.

APOLLO BEST BLOOM GALVANIZED IRON.

Look out for counterfeit galvanized iron!

Two Mills, at least, are trying to pass their iron for ours—we call that counterfeit.

One pretends that its product is from the original "Apollo" Mill.

T'other brands its product "Best Bloom"—two-thirds of our trade-mark.

Apollo Iron and Steel Company, Pittsburgh, Pa.

TURNBUCKLES.

Cleveland City Forge & Iron Co., CLEVELAND, O.

DO - - - YOU - - USE - - BOILERS ?

The Carnegie Steel Co., The Illinois Steel Co., The Apollo Iron & Steel Co., The Shoenberger Steel Co., Jones & Laughlins, Carrie Furnace Co. and National Tube Works Co., are among those who use the

"CAHALL" BOILERS.

Illustrated descriptive catalogue free on application.

Cahall Sales Department, Pittsburg, Pa.

HAND POWER HOISTING MACHINERY BELT CRANES STEAM ELECTRIC

THE CASE MFG. CO. COLUMBUS, O. U.S.A.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.

FUEL GAS PLANTS.

American Gas Furnace Co., 23 John St., N. Y.

W. S. ROCKWELL & CO.,

OIL FURNACES.

26 Cortlandt St., New York City

ENTERPRISE BOILER COMPANY

YOUNGSTOWN, O.

Draught Stacks, Blast Furnaces and Heavy Plate Work a Specialty.

Write for Estimates.

POWER TRANSMISSION

W. A. JONES FOUNDRY & MACHINE CO.

53-59 So. JEFFERSON ST. CHICAGO.

Are You Using Babbitt Metals?

If you want a strictly high grade anti-friction metal, try our "HIGH SPEED" Babbitt, at 18 cts. per pound, put up in boxes of 50 and 100 pounds. Once tried, always used.

SWARTS METAL REFINING CO., Anti-Monopoly House, 40 and 22 N. Desplaines St., Chicago, Ill.

MINING ENGINEER, CHEMIST, ASSAYER.

BENEDICT CROWELL,

Atwater Building, Cleveland.

Finished Case Hardened HEXAGON NUTS.

ODD SHAPES A SPECIALTY.

ANTHONY-BATES MACH. CO., Worcester, Mass.

Persistence In Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is now noticeable in every section of the country advertisers who have made themselves regularly prominent in the past two years will be first to reap the rewards of persistent publicity

See large Advertisement of

B. F. STURTEVANT CO., Boston, Mass.

On Page 24.

BLOWERS, FANS, ENGINES

THE UPSON NUT CO., Cleveland, O.

MANUFACTURERS OF

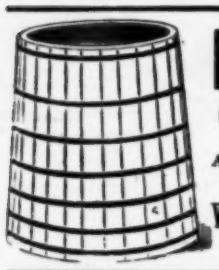
MACHINE AND CARRIAGE BOLTS, HOT FORCED AND COLD PUNCHED NUTS, LAG SCREWS, BOLT ENDS, WASHERS, ETC. Catalogue and Prices on Application.

Riveted Steel Pipe, Stand Pipes, Receivers.

WM. B. POLLOCK & CO.

with inquiry please give ad. No. 6. YOUNGSTOWN, O.

Blast Furnaces, Steel Plants, Boilers, Tanks, etc.



Red Cedar,

PINE OR CYPRESS.

Any Size, Any Shape.

WILLIAMS MFG. CO.,
Kalamazoo, Mich.

Miller, Wagoner, Fieser & Co.

PIG IRON, COKE.

Columbus, O., Hayden Bldg.
Chicago, Ill., Monadnock Bldg.
St. Louis, Mo., Bank of Com. Bldg.
Pittsburg, Pa., Hamilton Bldg.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

STILWELL'S

PATENT LIME-EXTRACTING

HEATER AND FILTER

COMBINED.

Is the only lime-extracting Heater that will prevent Scale in Steam Boilers, removing all impurities from the water before it enters the boiler.

Thoroughly Tested.

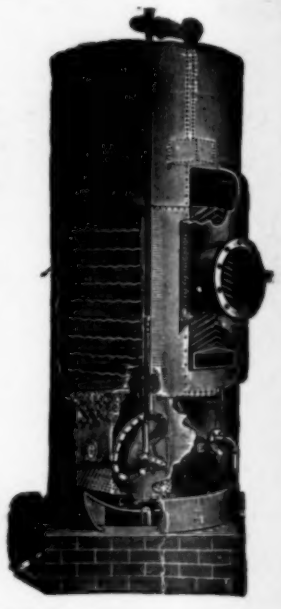
OVER 8.000 OF THEM IN DAILY USE.

ILLUSTRATED CATALOGUE.

Stilwell-Bierce & Smith-Vaile Company,

DAYTON, OHIO.

CHICAGO OFFICE, 311 Dearborn St.



The Holland Boat.

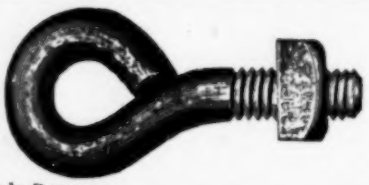
Compressed Air is the life of the Holland Submarine Torpedo Boat. By an INGERSOLL-SERGEANT Class "E" single acting Compound Air Compressor, air is compressed up to 2,500 pounds pressure, and is used for emptying the water ballast tanks, driving the horizontal steering engines, driving the engines controlling the diving gear, ventilating, respiration, and other purposes. The details of which have startled the world.

The Ingersoll-Sergeant Drill Company, Havemeyer Bldg., 26 Cortlandt St. NEW YORK.

Rockford Bolt Works, Rockford, Ill.

ALL KINDS OF

Bolts, Lag Screws, Rivets, Washers and Odd Bolt Work.



Mention the Iron Trade Review.

IT PAYS to advertise in The Iron Trade Review.

THE IRON TRADE REVIEW

Is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

AIR COMPRESSORS

Thoroughly up-to-date and the most simple, durable and economical machines on the market. Built on improved lines.

ROCK DRILLS, AIR LIFT, PUMPS, ETC.

Send for catalogue

RAND DRILL CO.

100 Broadway, New York.
1328 Monadnock Block, Chicago.

O. TEXTOR,

Chemist and Metallurgist

Analyses made of Metals, Ores, Fuels and Supplies for Furnaces, Steel Works and Foundries.
Ores sampled at mines, furnaces and lake ports.
Advice furnished to operators of Blast Furnaces Steel Works and Foundries.
Mining properties reported upon.
For 12 Years Chief Chemist to the Cleveland Rolling Mill Co.

168 Superior St., CLEVELAND, O.

AIR COMPRESSORS

For every application of Compressed Air Power.

Complete Catalogue upon application.

Clayton Air Compressor Wks.

26 Cortlandt St., NEW YORK.

CABLE ADDRESS "METALFAC-CHICAGO" A.B.C. CODE

E. H. STROUD & CO.,

METAL FACTORS.

The Products of and Supplies for

IRON · STEEL · TIN-PLATE · BRASS
COPPER · LEAD · & · ZINC · WORKS.

36 La Salle Street & 100 William Street

CHICAGO. NEW YORK.

THE ROBERT W. HUNT & CO.,

Bureau of Inspection, Tests and Consultation.

PITTSBURG: Park Building. CHICAGO: 1137 The Rookery. NEW YORK: 90 Broadway.

Reports on iron and steel processes and plants. Inspection of steel rails, splice bars, railroad cars, wheels, axles, etc. Chemical Laboratory—Analysis of ores, iron, steel, oils, water, etc. Physical Laboratory—Test of metals, drop and pulling test of couplers, draw bars, etc. Efficiency tests of boilers, engines and locomotives.

F. A. EMMERTON,

Analytical Chemist,

AND METALLURGIST.

Ores sampled at lake ports, mines and furnaces.
Mines and Metallurgical Processes examined.
Analyses made of Ores, Metals, Fuels, Railroad and Foundry Supplies, etc.

9 Bratenahl Building, CLEVELAND, O.

John T. Jones & Co.,

Mines, Prospects, Explorations and Mineral Lands, examined, experted, practical tests made and reported. Reliable and practical sampling done. Chemical analysis made. All work done by practical expert. Best of reference as to experience and reliability. Address

Suite 32, 115 Monroe St.,
MONTAUK BLOCK, CHICAGO, ILLS.

Millett's Patent

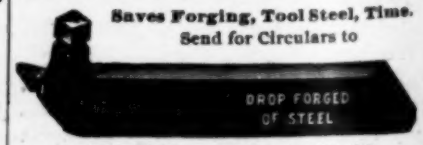
CORE OVEN.

The best in the world.

MILLETT CORE OVEN CO., Brightwood, Mass.

ARMSTRONG LATHE AND PLANER TOOL.

Saves Forging, Tool Steel, Time.
Send for Circulars to



ARMSTRONG BROS. TOOL CO.,

98 W. Washington St., CHICAGO.

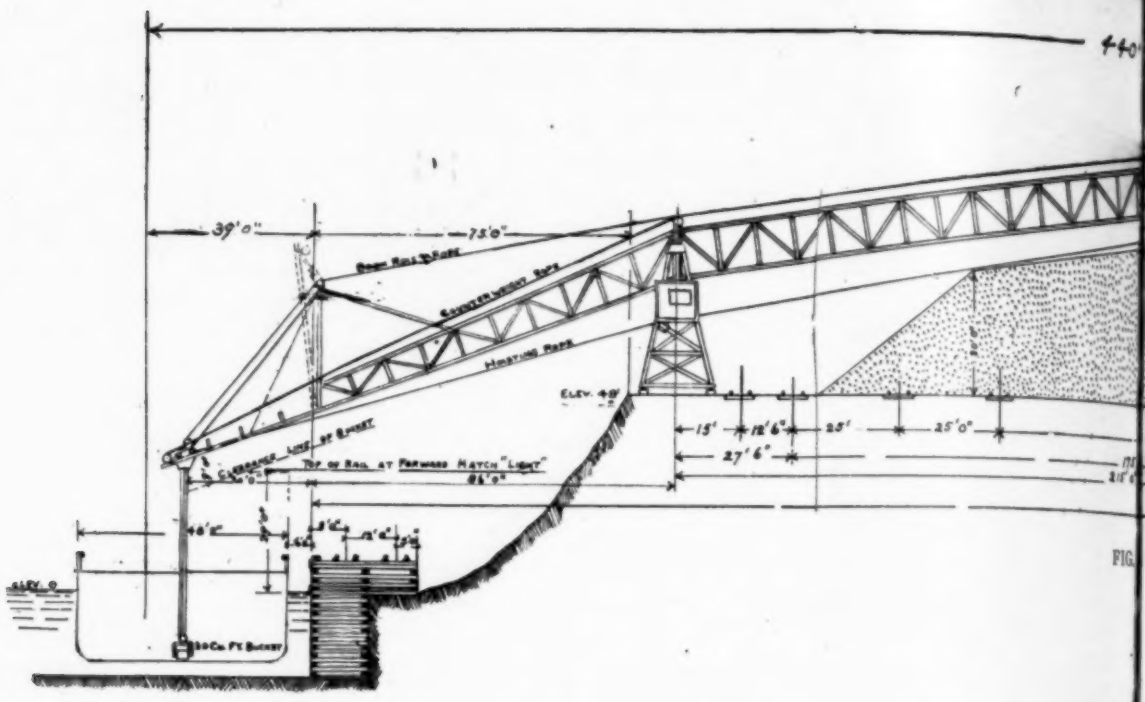
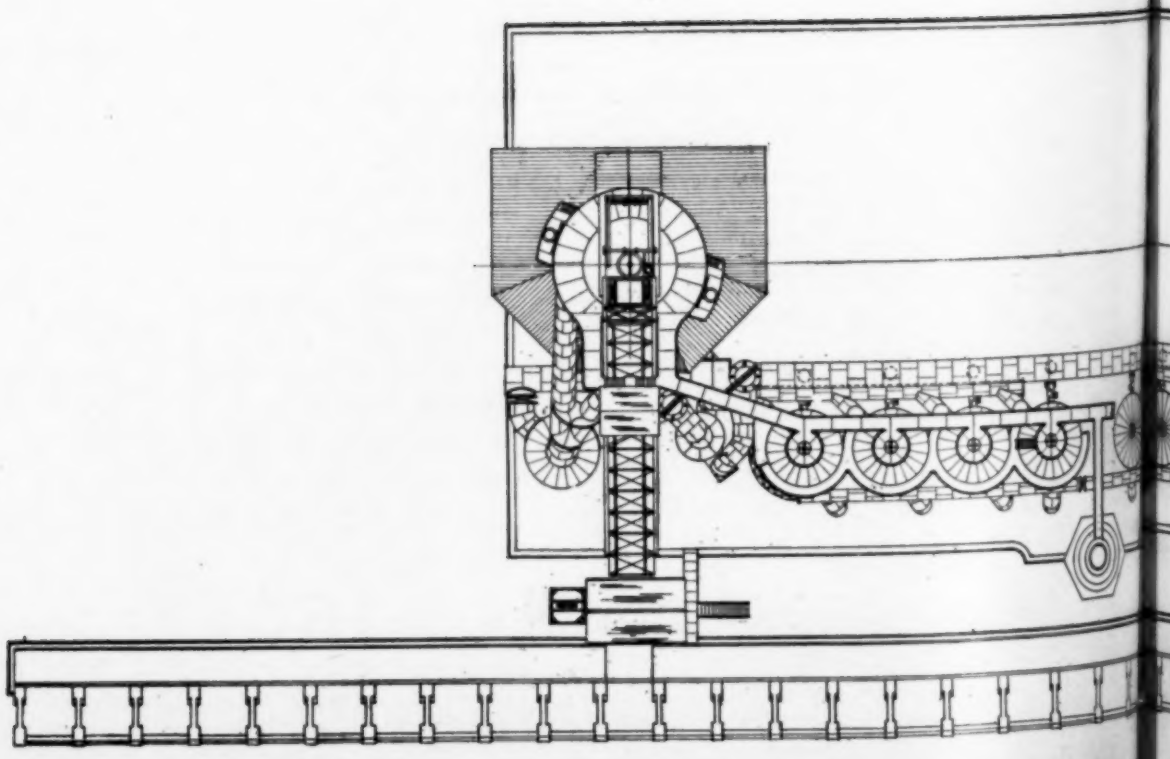


FIG. 1.—SECTION THROUGH ORE YARD AND

THE LORAIN STEEL CO.'S BLAST FURNACES

FIG. 2.—PLAN OF FURNACES, BINS, STOVE HOUSE A



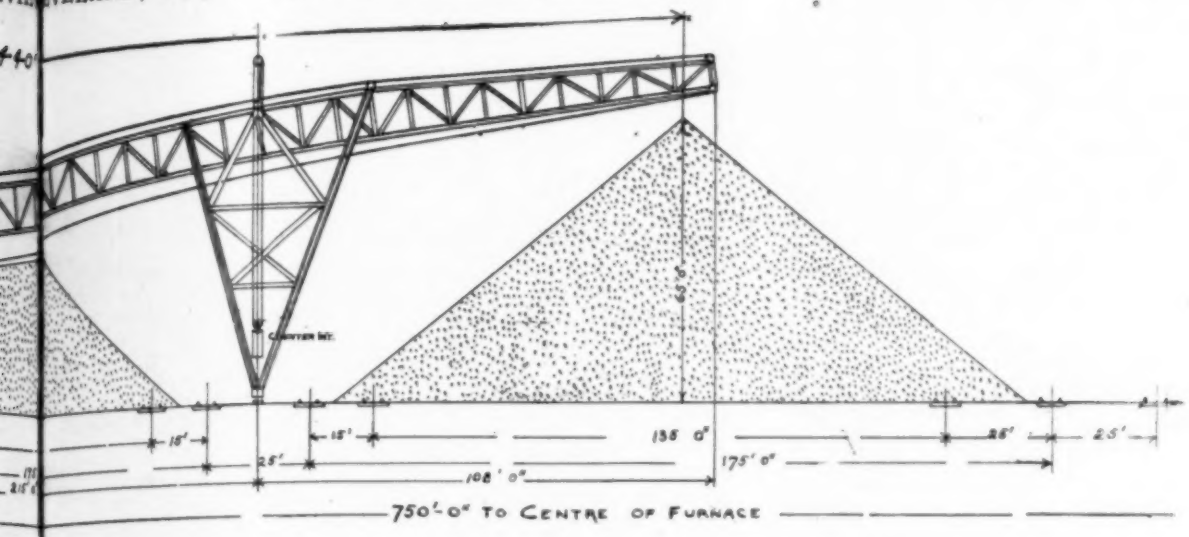
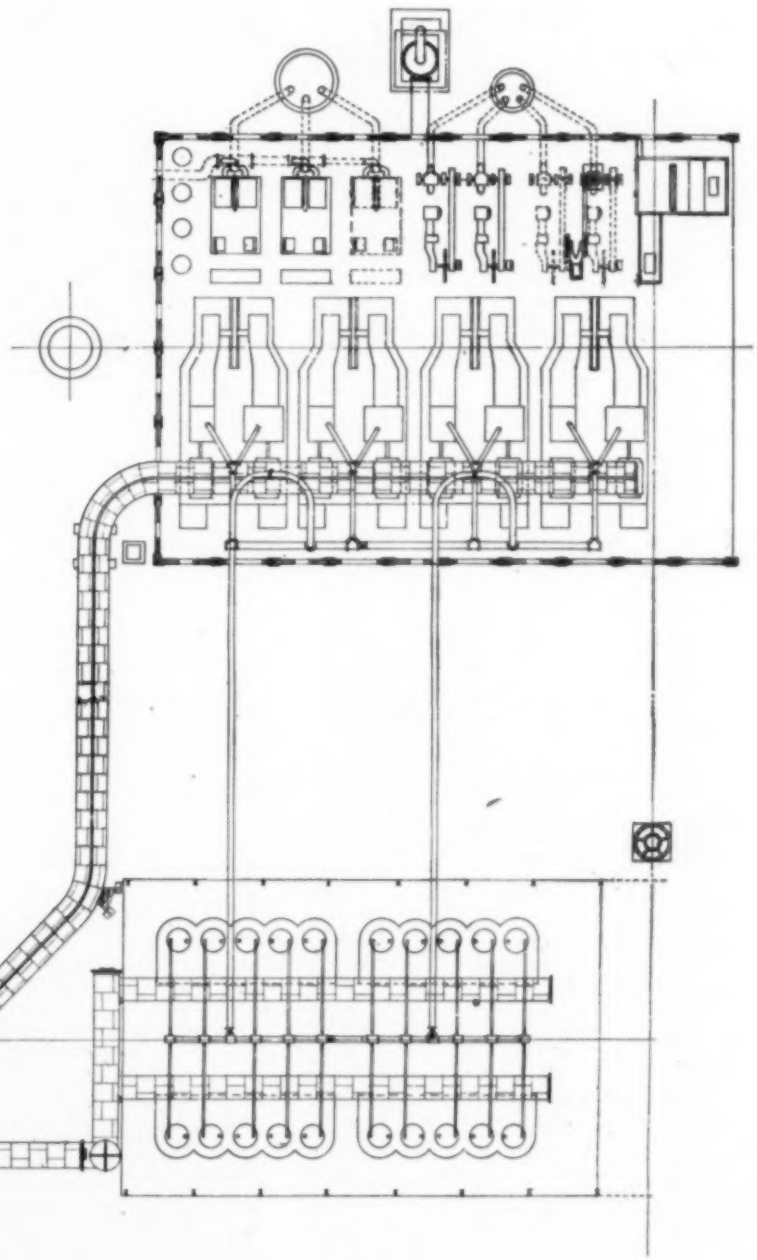


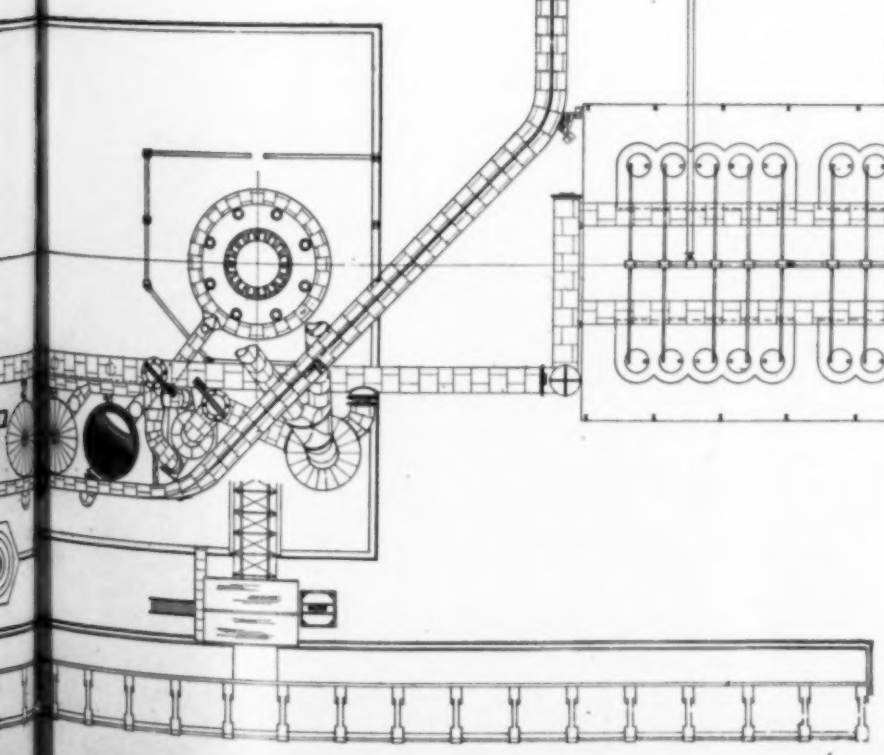
FIG.

BLAST FURNACES AT LORAIN, O.

IGH BRIDGE YARD AND DOCK.

STOVER HOUSE AND POWER HOUSE.





THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. JULY 7, 1898. CHICAGO, ILL. NUMBER 27

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The iron trade is unmistakably having its interval of midsummer quietness. The largest steel plants, that have their regular time of repair at the end of the year, are steadily at work; a considerable number of smaller works are idle and will take from one to two weeks for overhauling. With every wage scale agreed upon for next year, the length of the shut-downs will be determined entirely by repair necessities and the condition of order books. The rush of operations in the latter half of June gave a large output, from which the aggregate in the first half of July will show a decided falling off. The temporary slowing down of production is apparent in pig iron as well as in rolled products. In the Central West July will doubtless show the smallest output of Bessemer iron in twelve months. The market for Bessemer still drags in a monotonous way. The furnaces are selling no $10 iron, and meantime there is an industrious circulation of reports of evasions. How much of fact they contain and how far they are employed in an effort to break the price, is the interesting question of the moment. If iron is being sold that nets the furnaces but $9.75 or $9.85, it would seem that the quantity is not sufficient for the purposes of some buyers, in view of the special efforts being made to destroy the confidence of other sellers in the stability of an agreement which thus far they have kept. The start which the Bessemer market has been expected to receive from considerable contracts for steel for the second half of the year is still delayed. It is known, however, that large requirements of rod and wire mills are yet uncovered and that much tin bar and sheet bar tonnage remains to be placed for the later months of the year. While foundry irons have been quiet, the market is far from being at a standstill. Consumers of foundry irons, like those whose raw material is Bessemer, are making what in any other year would be called a large output. Furnaces are continually called on for quick shipment to foundries. There is some scarcity of soft Southern irons, and it is a question if this will not be a continuing feature, as soft irons from that section scarcely average as high in silicon under more recent practice. The largest contract in finished material closed in the week is that for 25,000 tons of plates and shapes for new vessel work at Newport News. Pittsburg plate mills are getting filled up to an extent that would indicate a general stiffening a little later. Mills booked for several months ahead are firm now in asking 1.10c, Pittsburg, for tank plates, but others are still $1 a ton below this. The steady stream of small orders is a feature of current business reported from several centers. There is general optimism in the trade, and confidence that the second half of the year will improve on the rather disappointing developments of June. There are plenty of encouragements to sanguine prophecy, whether the war situation, the trade balance, or gold shipments and the money market be consulted. Yet the plentiful production of iron is the one fact that must be dealt with, and the great scale to which all our operations in every line have been brought. The generalizations about enormous exports and the inflow of gold are proper, but just what tonnage all these admittedly favorable forces will put on the order books of furnaces, mills and foundries, is the indeterminate factor that keeps all paper advances from assuming any more tangible form.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
808 TRADESMEN'S BUILDING, July 6.

While the actual change in the market this week is very little, inquiries have been greater and the feeling seems general that the near future will see renewed activity. The railroads are maintaining their good record as buyers.

PIG IRON.—The demand of the employes at three Sharpsville furnaces for an advance of 10 per cent resulted in the banking of one furnace and the withdrawal of the demand at the other two, which were to have stopped had the men insisted on the advance. Thus far no similar demand has been made at other furnaces. There is still some Bessemer iron that can be had for less than the agreed price, although furnacemen seem to be quite united in holding to the agreement. There is little demand for iron even at cut prices. Foundry irons remain unchanged, No. 2 being generally quoted at $10, although a buyer who came into the market the past week for 100 tons monthly of No. 2 and No. 3 for the next six months got a lower price. Gray forge is quiet at $9.10 to $9.15 Pittsburg, and $8.80 and $8.85 valley mill. Quotations follow:

Bessemer, valley	$ 9.75 to	$ 9.85
Bessemer, Pittsburg	10.40 to	10.50
No. 1 Foundry	10.40 to	10.50
No. 2 Foundry	10.00 to	10.25
No. 3 Foundry	9.50 to	9.75
Grav Forge, valley		8.75
Gray Forge, Pittsburg	9.10 to	9.15

BILLETS AND RODS.—The market in billets is very quiet. The American Steel & Wire Co. is said to be in the market for about 100,000 tons, but the impression prevails that the order will be split up, purchases being made from steel works nearest to the various mills, with a saving of freight. None of the order has been placed as yet. The price of billets is held at $14.75 maker's mill, Pittsburg, and $14.50 valley and Wheeling district. Sheet and tin plate bars remain unchanged at $16.50 and $16.75 maker's mill. Rods have taken a slight drop, $19.75 to $20 being the present quotation.

IRON AND STEEL SKELP.—Prices are as follows, with little doing: Grooved iron skelp, 1.05c to 1.07½c; sheared iron skelp, 1.12½c to 1.15c; grooved steel skelp, 97½c to 1c; sheared steel skelp, 1.05c to 1.07½c.

STRUCTURAL MATERIAL.—While there are no very large orders, the number of small ones is considerable, making a good aggregate tonnage. A local firm will get the contract for the steel required in the new San Francisco post office. Prices remain unchanged and are as follows: Beams and channels, 3 to 15 inches, 1.15c; 18 to 24 inches, 1.25c; tees, 1.20c; zees, 1.15c, and angles, 1.05c. Universal plates in connection with other shapes are selling at 1c; alone, at 1.10c.

SHEETS.—Quite a number of the sheet mills have entered upon their annual shut-down for repairs. Most of these will resume in about a week's time. No. 28 is quoted at 1.92½c to 1.95c. Galvanized sheets are quoted at 80 and 5 per cent to 80 and 7½ per cent off list with 15 cents freight.

PLATES.—The local mills are running full. Further locomotive work was given late last week to a local firm. A 25,000-ton contract for Newport News vessel work was also booked by Pittsburg. Prices remain the same. Tank, 1.10c; shell, 1.15c; flange, 1.20c; fire box, 2c and upwards.

BARS.—The market is rather quiet with prices unchanged. There is no large buying at present. Quotations are 90c to 92½c.

RAILS AND TRACK MATERIALS.—The large amount of building done and to be done by the railroads has kept and will

keep track materials in steady demand. Prices are as follows: Rails, $18, Pittsburg, and track material is quoted as follows: Iron track-bolts, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c; splice bars, 1.10c to 1.15c; links and pins, 1.20c.

PIPE AND TUBES.—The market is in rather an unsettled state. The activity of the mills last week would indicate good business, but their full operation was rather for the purpose of getting all orders filled so far as possible before the annual shut-down for stock-taking. Some of the mills closed down Saturday night and others were expecting to follow early this week. The demand for merchant pipe is better than for some time past. Prices, however, remain the same. Additional discounts of six 10s for less than carload lots and six 10s and 2½ for carload business are quoted. Base discounts are as follows: Butt weld, black, 57 per cent off; lap weld, black, 67 per cent off; butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off. Discounts on merchant boiler tubes are as follows: 2¼ inch and smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off. Inserted joint casing is quoted at 60 and 5 per cent and screw and socket joint at 65 and 5 per cent.

FERRO-MANGANESE.—The market is steady at $50 for 80 per cent domestic, delivered.

SPELTER.—There has been a reaction from the recent high level and the quotation is now $4.80 to $4.85. It was hardly to be expected that the $5.25 figure could be long maintained, and there was little buying at that price.

SPIEGEL.—There is a dull market, although the basis remains unchanged at $23.50 and $24.

OLD MATERIAL.—The shutting down of the mills makes the demand for old material very light. Among the sales mentioned are 1,200 tons of steel melting scrap at $10.50, gross, and 1,000 tons of steel rails at $10. Other transactions reported are at the following prices: Old iron rails, $13.50 to $13 75, valley; cast borings, $6, net, valley; wrought turnings, $7, net, valley; railroad cast scrap, $9.50; wrought scrap, $11.50, valley; iron axles, $16, net; steel axles, $12.50, gross; car wheels, $10.50, gross; charcoal scrap, $10, gross; billet and bloom ends, run of mill, $11; busheling scrap, $9.50 net; machine scrap, $9 gross.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, July 6.

There is a continued demand for nearly all steel shapes and sales last week were very satisfactory to the mills, though no very large single orders were placed. The mills in this territory are either shutting down or preparing to do so, but it is not expected that the shut-down will be of long duration. Order books are well filled, and this will make it necessary to start again as soon as necessary repairs can be made. The Joliet plant of the Illinois Steel Co. shut down on Monday for repairs. The Milwaukee plant was shut down over Sunday, but it is not thought it will be necessary for this mill to remain out. The Milwaukee blast furnaces of the same company are banked, owing to a strike of the furnace operators. The North furnaces are running for the present, taking the place of the Milwaukee furnaces.

PIG IRON.—Only comparatively small sales were made last week by both Northern and Southern furnaces. The demand is not very heavy at present and it is expected that sales will be on about the present scale for the next month. As previously stated, the local furnaces welcome the smaller demand, as it enables them to get caught up on their shipments. The stocks on hand in furnace yards in this district are very small, and the furnaces are making shipmntse as fast as possible to meet the requirements of their customers. Prices of Northern irons continue firm, but Southern furnaces are still weak. The larger Southern furnace interests are holding for higher prices than are prevailing at present, but sufficient capacity is willing to sell at low figures to keep the market down. We make no changes in quotations, although good buyers can undoubtedly secure concessions from the figures we give on Southern irons:

Lake Sup. Charcoal	$11 50 @$13 00	Southern Coke No. 3	$ 9 75 @$10 00
Local Coke Fdy. No. 1	11 50 @ 12 00	Southern No. 1 Soft	10 35 @ 10 60
Local Coke Fdy. No. 2	11 00 @ 11 50	Southern No. 2 Soft	10 10 @ 10 30
Local Coke Fdy. No. 3	10 75 @ 11 00	Southern Silveries	11 25 @ 11 50
Local Scotch Fdy. No. 1	11 50 @ 12 00	Jackson Co. Silveries	12 50 @ 14 50
Local Scotch Fdy. No. 2	11 00 @ 11 50	Ohio Strong Softeners	12 00 @ 12 25
Local Scotch Fdy. No. 3	10 75 @ 11 00	Alabama Car Wheel	15 00 @ 16 00
Southern Coke No. 1	10 35 @ 10 60	Malleable Bessemer	11 50 @ 12 00
Southern Coke No. 2	10 10 @ 10 35	Coke Bessemer	11 50 @ 12 00

BARS.—Considerable business was done last week, most of it in small lots, although some good sized transactions were made. A few season's contracts were made involving a good tonnage. The market is slightly firmer but no changes are made in quotations. Common iron is quoted at 1.05c to 1.10c; guaranteed, 1.10c to 1.15c; soft steel bars from strictly billet stock, 1.05c to 1.10c.

RAILS AND TRACK SUPPLIES.—Some fair sales of rails have been made of both light and heavy sections. They were all for comparatively small lots, but made a good total. Quotations are as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.15c to 1.25c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.50c to 1.60c.

BILLETS AND RODS.—Only a few small sales of billets or rods were made last week, and most of these were made by mills farther East. The demand is fair and further business is expected soon, which will include some large interests. Prices are unchanged at $16.25 for billets and $22.25 for rods.

CAR ORDERS.—Two orders for cars of 500 each were placed here last week and more business is expected to be given out soon. The sales of bars, axles and other car material were quite good and give every prospect of continuing so.

STRUCTURAL MATERIAL.—The eight-track Drainage Canal bridge is still pending, but it is expected the matter will be decided very soon. The Montgomery Ward building, mentioned some time ago, has been let to the Geo. A. Fuller Co., the steel to be furnished from Pittsburg. No other large contracts were let last week, but the small order business and orders for stock from the bridge builders continue good and quite large sales of this character are made every week. The market is very firm. Quotations are as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.20c to 1.25c; plates, 1.15c to 1.25c; tees, 1.35c to 1.40c. Small lots from stock are quoted at ¼ to ½ cent higher.

PLATES.—The demand for plates continues good and sales last week while not individually large made a considerable aggregate. Further business is in sight and will be placed soon. The market is firmer and quotations have been advanced slightly. Some mills are not selling at the bottom figures we quote but ask quite a little more. Prices are made as follows: Tank steel, 1.15c to 1.25c; flange steel, 1.20c to 1.40c; fire box steel, 1.85c to 5c.

SHEETS.—There have been quite large sales made in the past week, mostly in small lots, and the demand indicates a continuance of the good business. Black sheets are particularly active. No. 27 black sheets are quoted at 1.95c to 2.05c, and galvanized sheets at 80 and 10 and 2½ per cent discount.

MERCHANT STEEL.—Several good season's contracts were placed last week by agricultural implement makers, and this business, together with the good run of small orders and general business that has come in, has made a good total for the week. The demand indicates further business of good volume to be placed soon. Prices follow: Open-hearth spring, tire and machinery steel, 1.60c to 1.70c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.50c to 1.60c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—This branch of the market continues quiet, with only small sales and not a heavy demand for any grade of scrap. Dealers are looking for a quiet summer. Prices are unchanged, and in some cases are only nominal as given. Dealers' selling quotations are as follows:

Old iron rails, gross	$12 25@$12 50	Axles, net	$14 25@$14 75
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 25@ 4 50
Old steel rails, short	8 75@ 9 00	Wrought turnings, net	6 00@ 6 50
Old wheels, gross	11 00@ 11 50	Axle turnings, net	7 00@ 7 25
Railroad forge, net	11 50@ 12 00	Mixed steel, gross	7 25@ 7 50
Dealer's forge, net	10 00@ 10 50	Stove plates, net	5 75@ 6 00
No. 1 mill, net	7 50@ 8 00	Heavy melting steel, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net.	12 75@ 13 00
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., July 6.

The end of June showed a record of ore shipments largely in excess of last year's to the same date, but with it a condition at Lake Erie docks that has brought further agitation of a tying up arrangement among vesselmen. But even with Lake Superior ore coming down wild at 45 cents, and no cure of the delays at unloading docks, there is no prospect that

anything will be done apart from individual initiative. Less ore will be wanted in the valley in July than in any month of the year, owing to furnace shut-downs. Meantime certain Mesabi ores are about the only ones which are being particularly pushed. On some of these offers have been made at lower figures than heretofore without bringing orders. One ore, held at $2.25 and later at $2.20, is reported to have been offered at $2.17½, but furnacemen are not hurrying in the matter of making their final purchases. Eastern shipments from Buffalo and Erie promise to run well up before the season ends.

PIG IRON.—No change in the policy of the Bessemer furnacemen has resulted from the meeting of last week. There is no deviation from the programme of curtailment, except, as in one or two cases, where a furnace that for any reason cannot stop arranges for an additional 30 days' shut-down by another stack. The sales of Bessemer iron reported are still at 15 to 25 cents below $10 in the valley, but there is little buying. Reports of evasions of the price agreement are still heard, but it is difficult to divide the proportion of them based on actual transactions from that prompted by interest in the breaking up of the arrangement. Whatever their opinions as to these rumors, there is a strong contingent of producers who are showing entire indifference to any offers below $10, and who expect a turn toward a more active market later in the third quarter. The demand of employes at certain Shenango valley furnaces for an advance of 10 per cent in wages led to the banking of Mabel Furnace, and this was followed by the withdrawal of the demand at Spearman and Alice furnaces. Foundry iron has been weak and inactive, and $9.25, furnace, is a common quotation on No. 2, though some sellers are a trifle higher. Gray forge, too, is weaker, under the checking of mill operations. Sales for June delivery have been made at $8.75 valley furnace, and mills report some deliveries on that basis, where the freight was 10 cents. We quote f. o. b. Cleveland:

Bessemer	$10 65	Valley Scotch No. 1	$10 40@10 65
No. 1 Strong Foundry	10 40@10 65	Valley Scotch No. 2	10 20
No. 2 Strong Foundry	10 10@10 40	Gray Forge	9 25
No. 3 Foundry	9 65	Lake Superior Charcoal	11 55

FINISHED MATERIAL.—A fair volume of mail orders this week is reported by local jobbers and representatives of mills, the business being distributed among various lines. There is a steady local tonnage in steel bars, and in addition to a 1,000-ton contract just closed one for an equal amount is pending. We quote 97½c to 1c, Cleveland. On bar iron 1c, Cleveland, is the common price. Plate mills vary as to terms and deliveries. Pittsburg makers, and one in particular, are well sold ahead, one mill there holding for 1.10c, Pittsburg, on open-hearth tank. Cleveland deliveries are to be had, however, at 1.13½c, equivalent to 1.05c, Pittsburg mill. Sheet mills are in the same situation as last week, with the firmer tone still prevalent. We quote 2c for No. 27, in small lots. Structural work is quiet. Beams and channels are maintained at pool prices, with some deviation on angles. The wire and wire nail works are accumulating large stocks under the present policy of the jobbers to carry little of either. There is general expectation of a good fall trade, but meantime some weakness may develop. Cleveland mills are holding to $1.30 for wire and $1.10 for wire nails. There seems to be some cutting, principally from Pittsburg, on Eastern business. Meantime the rod market is very quiet, quotations talked of ranging from $20 to $20.50. There is no buying locally, either in billets or rods, but it is probable that local interests have not covered their wants in the former.

CINCINNATI.

July 5.

The current review of Rogers, Brown & Co. makes the following comment on conditions in the iron market, particularly as affecting Southern iron, at the close of the first half of the year: "The week under review covers the last days of the first half and the opening days of the latter half of an eventful year. The strange experiences incident to a foreign war, rendered the general business outlook one of uncertainty, but owing to the splendid patriotic sentiment prevailing, and full assurance of the country's ultimate triumph in the contest, there has been no pessimistic view as to the final outcome, but the interruption of the export business in a measure, together with a little uncertainty as to the trend of trade pending the conflict, favored the 'bearish' element, and prices of pig iron have suffered. The exceeding low prices of non-Bessemer Lake Superior ores, and the reasonable cost of coke, has enabled the Northern manufacturers of pig iron to produce at very low figures; and their geographical advantages as to consuming points has necessitated low prices on Southern irons, so that the trade has been enjoying about as low prices as ever were made on pig iron from either district. It is believed that the bottom has been reached. Consumption is fully equal to production, and in all likelihood a little in advance. The opinion prevails that an excellent fall business is before us, and while the mid-summer period may bring the usual lull, there is reason to believe that it will not be so marked as in normal times. Buyers feel scarcely any timidity in buying at prices prevailing, especially for future delivery, as there is a realization of the fact that they can buy the raw material at about what it cost to produce it, and with the revival of general business and the expansion of our export trade in the near future, an advance in values of all commodities, and especially pig iron and metals, may be reasonably looked for. The business of the week has been very satisfactory as to volume, though prices have been somewhat irregular, much depending upon the peculiar conditions and deliveries in each important transaction. We continue to quote f. o. b. Cincinnati as follows: Southern coke, No. 1 foundry, $9.50; No. 2, $9.25; No. 3, $8.85; No. 4 and gray forge, $8.50; mottled $8.25 to $8.50; No. 1 soft, $9.50; No. 2, $9.15; Tennessee charcoal, No. 1, $12.50 to $13; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Jackson county silvery, No. 1, $12 to $12.50; standard Georgia car wheel, $14.25 to $15.

BUFFALO.

July 5.

The activity in buying and inquiry noted last week continues. The most notable feature in the pig iron situation in this district, however, is the heavy call for shipments on orders already placed. The repairing of breaks in the Erie Canal has allowed a full opening of water shipments, and a strong demand for rail shipments is also noticeable. Taken together, these two elements are causing the furnaces in this district some difficulty to keep up with the demand and stocks of certain grades are already entirely gone. Every indication points to a shortage in the most popular brands of iron before the navigation season is much further advanced. We quote for cash f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $11 to $11.25; No. 2, $10.50 to $10.75; Ohio strong softener No. 1, $11.50 to $11.75; No. 2, $11 to $11.25; Jackson Co. silvery No. 1, $14; Southern soft, No. 1, $11.50 to $11.75; No. 2, $11.15 to $11.35; Lake Superior charcoal, $11.50.

Southern Pig Iron Shipments.

The statement of pig iron shipments from Alabama and Tennessee furnaces in the first five months of the year shows a total of 520,500 tons—111,000 tons in January, in February 98,500, in March 103,000, in April 105,000, in May 103,000. The shipments from the Birmingham district alone, in the five months, were 323,000 tons; cast iron pipe from the Birmingham district in the same time, 20,750 tons. The increase in pig iron shipments over the same period in 1897 is 43,984 tons, and in cast iron pipe, 6,511 tons. The cast iron pipe shipped from Alabama and Tennessee in the five months ending with May amounted to 54,000 tons. The shipments of pig iron abroad, from Alabama and Tennessee in the five months were 56,300 tons—15,000 tons in January, 13,500 tons in February, 19,300 tons in March, 6,100 tons in April and 2,400 tons in May. The effect of the war upon the export trade is plainly shown in these figures.

THE *Boiler Maker* says of conditions in the trade supported by boiler works: There continues to be a large demand; prices stiffen just a little, and every one is busy, all not more nor less than for two or three months past. Other things than iron and steel have advanced a great deal, and we have about concluded there are not likely to be any better prices. There is nothing to warrant a large increase. It is this month that the mills take their annual account of stock and make needed repairs, so there is a considerable reduction in the output, and deliveries will be unsatisfactory until the summer is at its end.

THE IRON TRADE REVIEW

AND

INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

PUBLISHED EVERY THURSDAY BY

THE IRON TRADE REVIEW CO.,

CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.

G. H GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
522 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.

PITTSBURG:
808 TRADESMEN'S BUILDING.
J. B. ALLEN, Manager.

Subscription (strictly in advance), $3 per annum. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW, through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

JULY 7, 1898.

AT intervals in the past 20 years the fate of the merchant furnaces of the Central West has been under discussion, as each new move has been made by consumers of pig iron toward independence of outside supplies. But the merchant furnaces, while here and there one has fallen by the way, in the onward march to the regime of brick stoves, rapid driving, multiple tuyeres and large volumes of air, are for the most part still in the race, in spite of well meant obituaries. The plans for four 500-ton blast furnaces at Northern Ohio steel works, and the expectation that these furnaces will be in blast in less than a year, producing the equivalent of the output of seven valley stacks, have furnished new occasion for words of farewell. It is certain that the steel companies now building furnaces have been chief factors in the Bessemer pig iron market of the two valleys in the past three years and that their purchases will be greatly missed. It is to be considered, however, that even with their new furnaces running, both will be considerable buyers of iron. Moreover, if the past year's rate of increase in the output of the leading steel companies of the Pittsburg district is kept up in the next 12 months, it is safe to reckon that even with their large iron-producing capacity they may yet be in the market as they have been in the past year. It must be noted, too, in this connection, that the production of Bessemer steel rails has been concentrating of late in the Chicago and Pittsburg districts, and that the proportion of the country's Bessemer steel production furnished by those districts has been increasing. There is also the outlet which some of the valley furnaces are already finding, in the greatly enlarged demand for basic open-hearth steel. The Pittsburg district may be expected to be a buyer of basic iron, for a time at least, to a larger extent than heretofore. While there is a tendency on the part of producers farther East to work into specialties—products which call for more labor in finishing, the advantages of Pittsburg and other Central district plants promise to make them the principal source of the materials which run rapidly into tonnage, and the great supply center of cheap billets, rods, tin bars, sheet bars, rails, etc. In another respect the outlook for Central Western furnaces of the fittest type is still far from hopeless. They may yet supply a larger proportion of the foundry iron of the country than in the past few years. A large Southern steel plant will be ready to start up by the time the Northern Ohio blast furnaces now building are ready. It will relieve the pressure of Southern iron upon Northern markets; and cheap non-Bessemer ores from Lake Superior, as they have done in a noticeable way in the past year, will enable valley furnaces to widen their market; probably to the extent of keeping Southern irons below a line running midway through Ohio. The soft irons of the South are not so large a proportion of the output of that district as they were. Present practice and the crowding for large outputs have brought the silicon average down. Where high silicon irons are made, they must bring their price, in the same way that special Northern softeners are held for a price representative of the cost of making them. While the merchant furnacemen of the Central West have no call to build more stacks, there are some developments in the iron trade that are going to help them hold their position; and these should not be overlooked in the general commiseration.

THE frictions attending the first days of the new war tax regime will be eliminated with time. Meantime the disposition shown, particularly by certain corporations, to haggle with customers as to which shall pay the tax, contrasts strongly with the patriotism of men who are enduring the perils of the front. Business men, on the other hand, who are glad to pay whatever the Government imposes upon them, are finding some difficulty in discovering the exact intent of the law. For example, the provision requiring a 10-cent stamp to be placed on every broker's note or memorandum of sale would apply, according to some interpretation, to not a few transactions in iron and steel. Strictly construed it might apply to all acknowledgments or acceptances of orders for such products, booked by middlemen. The counsel of the New York Coffee Exchange has decided that a commercial broker must affix a 10-cent stamp on the original written evidence or other memorandum of every sale he makes elsewhere than at any exchange or board of trade.

THE iron and steel export statistics for May and the 11 months ending with that month indicate a gratifying aggregate for the fiscal year closing June 30. Pig iron exports were small in May, being only 9,170 tons as against 28,741 tons in May, 1897; and in some other lines the outward movement of iron and steel was curtailed by the war. But when the year's totals come to be scanned, it will appear that they have been no insignificant factor in our unprecedented output of iron. In the 11 months, scrap, for example, was exported to the amount of 50,048 tons, or four and a half times the amount in the 11 months of the preceding fiscal year. The bar iron

total was 5,500 tons against 3,500. Steel bars apparently fell off from 42,000 tons to 15,000; but to the latter amount is to be added 15,000 tons of wire rods, which in the previous year were classed under the general head. Rail tonnage nearly doubled, being 186,222 in the 11 months ending with May, as against 94,727 tons. The amount of structural material was 29,315 tons; no separate record was kept in 1897. The wire tonnage was 58,000, against 49,000 last year. In nails there has been a notable increase—from 10,500 tons of cut nails in 11 months last year to 15,000 tons this year, and from 4,500 tons of wire nails to 12,500 tons. The totals of machinery exports were $29,000,000 and $33,000,000, respectively, showing that the predictions of a falling off were not well founded. The total value of iron and steel exports to the end of May (11 months) was $63,235,029, compared with $52,187,175 in the corresponding period last year—an increase of 20 per cent.

THE cutting down of iron ore imports to the United States by the war is emphasized in Treasury Department statistics. In May, 11,776 tons of ore was imported, as compared with 41,717 tons in May, 1897. In the 11 months ending with May the total imports were 352,305 tons, as against 510,991 tons in the like period in the preceding year. Lake Superior ores are making up the deficiency. But apart from any war interruptions the indications are that only to a limited extent will outside ores be used in the East, except by furnaces which can run entirely on a foreign mixture and export the product, getting the benefit of the drawback. Cheap Lake Superior ores and steadily declining lake freights, with special concessions on rail rates to the East, have brought about this condition.

PERSONAL.

Arthur Keen, of Birmingham, Eng., who has been in the United States for several weeks, spent a portion of last week in the Cleveland district, visiting the Lorain plant and several engineering works in Cleveland. Mr. Keen, after a brief stay in Canada, will sail for home about the middle of the month. As vice-president of the Iron and Steel Institute and the Institution of Mechanical Engineers and a member of the board of management of the British Iron Trade Association, Mr. Keen is closely identified with developments in iron and steel in his country. He is chairman of the Patent Nut & Bolt Co., Ltd., of Birmingham, which has blast furnaces, coal mines and mills, director of Bolckow, Vaughan & Co., Ltd., of Middlesbrough, and chairman of the new Cransley Iron & Steel Co., Ltd., near Kettering, Northamptonshire, which has blast furnaces, and iron and coal mines. Mr. Keen visited the United States with the Iron and Steel Institute in 1890. He speaks with interest and appreciation of the advances made in the past eight years. He remarks with satisfaction the recent evidences of cordial feeling between the governments of the United States and of Great Britain and believes that the time has come when the world should realize that the two countries will stand together in the defense of each other's interests whenever it may become necessary. Mr. Keen, during his stay at Pittsburg, visited the principal iron and steel plants, and a reception in his honor was given by President Schwab, of the Carnegie Steel Co., Ltd.

Capt. James L. Botsford, of Youngstown, O., treasurer of the Mahoning Valley Iron Co. from 1879 to 1896, has been appointed a brigadier general by President McKinley.

J. W. Gardner, formerly with the Chicago office of Manning, Maxwell & Moore, and more recently with the sales department of the Stirling Co., of Chicago, has accepted a position in the sales department of the Sargent Co., of Chicago, maker of brake shoes and steel castings. Mr. Gardner has a very wide acquaintance, and is very popular with the trade, and he will undoubtedly be able to swell the sales of the Sargent Co.

S. H. Harrington, of the Harrington & King Perforating Co., Chicago, has returned from a six months' trip in Europe, which he took hoping to regain his health, which at the time was impaired. He is now fully recovered and has resumed the management of his business.

W. D. Sargent, general manager of the Sargent Co., Chicago, maker of brake shoes and steel castings, sailed July 6 on the Britannic for Europe, in the interest of the "Diamond S" brake shoe, of which he is the patentee. Mr. Sargent will be gone until October, and will visit most of the countries of Europe, going as far as Russia. He will be accompanied on the sea voyage by Angus Sinclair, of *Locomotive Engineer*.

S. T. Wellman, of the Wellman-Seaver Engineering Co., Cleveland, sails for Europe two weeks hence.

The Iron and Steel Directory.

The 14th edition of the Directory of the Iron and Steel Works of the United States, issued this week from the office of the American Iron and Steel Association, is a volume of nearly 400 pages, considerably larger than any preceding edition. The principal new feature of the last Directory, that of 1896, was a list of the malleable iron works in the United States. The new volume has several lists never before given, including rail mills, structural mills, steel casting works, bolt, nut and rivet, chain, seamless tube and riveted pipe works. The price of the new Directory is $7. It will be sent postpaid, from any of the offices of *The Iron Trade Review*.

The American Navy.

The recent rapid growth of the American fleet and the extraordinary increase just authorized by Congress make it one of those which the world must reckon with hereafter. We had, a day or two ago, actually in commission, counting all sorts of craft, 73 vessels on the Atlantic Station, under Admiral Sampson; seven in Commodore Schley's command, 11 in Admiral Dewey's, six in Admiral Miller's Pacific Squadron, five in Commodore Howell's Northern Patrol Squadron, seven on special service, 42 unassigned, of which some were for coast defense; finally, seven training and receiving ships. Here is a total of 158 vessels in commission, with eight or ten more preparing for commission. They include many, like colliers, that are not fighting craft, and many torpedo craft and auxiliary cruisers, yet the aggregate of belligerent strength is certainly noteworthy. It is supplemented by 14 armed revenue cutters co-operating with the navy.

We are building five first-class battleships, namely, the Kearsarge and Kentucky, each three-fifths finished; the Alabama, 53 per cent; the Illinois, 46, and the Wisconsin, 38. We have six torpedo boats, the Rowan, the Mackenzie, the Dahlgren, the Davis, the Fox, and the Farragut, all over four-fifths completed; the submarine boat Plunger, three-fourths; the Craven, half ready, and the Stringham, Goldsborough, and Bailey, less advanced. Authorized by the late act of Congress but not yet contracted for are three first-class battleships, four monitors, 16 destroyers, 12 torpedo boats, and a lake gunboat. We must not forget, too, the sister ship of the New Orleans, completing for us in England.—[NewYork Sun.

THE Cleveland Fence Co., Indianapolis, Ind., gave a reception to its friends on Friday, July 1, at its plant, and later in the day took the guests into the country for an "old-fashioned" supper. The occasion was the celebration of the close of a very prosperous business year. The invitations issued were unique, being a cast iron plate, with "The Byrams invite you, 3:30 P. M., Friday, July 1, 925 Biddle st." cast on the face.

THE amount of iron in American Pig Iron Storage Warrant Yards June 30 was 258,000 tons, 5,000 tons having been withdrawn and 100 tons put in yard in the preceding 10 days. The stock in yard June 30, 1897, was 221,600 tons; on June 30, 1896, it was 112,000 tons, and on June 30, 1895, 122,200 tons.

ADJUSTABLE OPEN-BACK POWER PRESS.

Perhaps no type of power press is so extensively used for the manufacture of sheet metal products as that shown in the illustration. The range of work of which it is capable includes blank cutting, forming, perforating and combination die work, covering a large portion of operations needed in the manufacture of cans, pieced tinware, lamp and lantern trimmings, electrical and brass goods, etc.

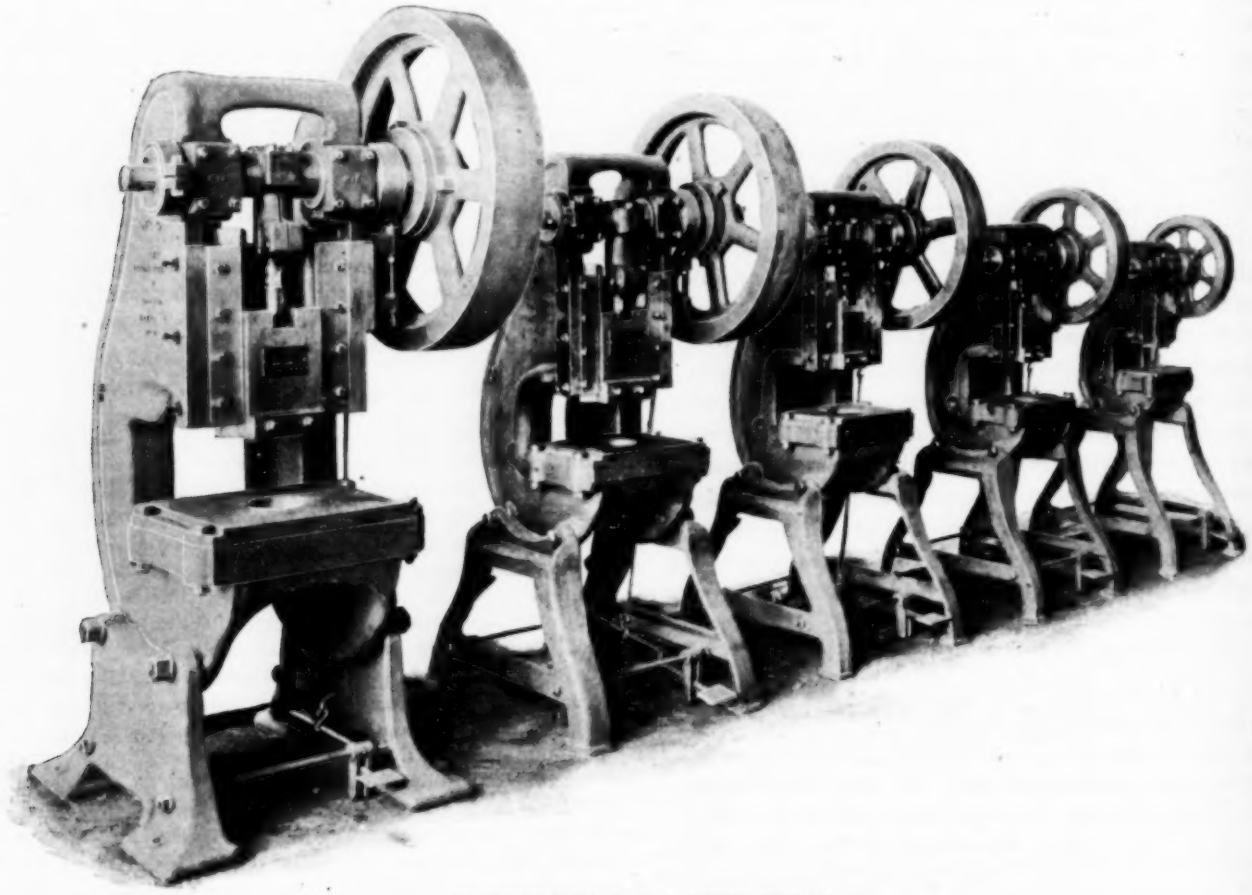
Some of the features embodied in the new patterns of this machine are thus enumerated:

The shaft bearings are provided with bronze bushings, insuring a smooth running bearing, not liable to cut. Bushings can be replaced at small cost when shaft or bearings become badly worn, which makes repairs nominal, as compared with the old method of having to bore out and enlarge bearings for babbitting. The clutch mechanism is so constructed that the clutch-pin is automatically withdrawn with the slide up.

The steel driving collar or sleeve is provided with a recess faced with tool steel, against which the clutch-pin acts when running the press. This recess is also constructed so that wheel can be operated in either direction by hand for removing punches from dies when they become stuck, or whenever this may be desirable, particularly when setting dies. While with this clutch mechanism it is not essential that the belt be removed for setting dies, this is an extra precaution on the part of the operator. The clutch mechanism is so constructed that one quarter of a turn of the shaft in either direction by hand disengages the automatic clutch arrangement, although the treadle be depressed, as the slide must rest with the stroke up in order to have the clutch-pin engage. A safety catch is placed on the front cross-bar to be slipped under the treadle when setting dies. The slide or ram is extra long, and is fitted to place by scraping, with gibs arranged for easy adjustment. The slide connection is of forged steel, with ball and socket connection at the lower end, inserted into the center of slide in such a way that the end thrust comes directly over and above the center of the punch and in the center of the slide bearings, preventing any undue side strain. The connection is provided with long adjustment, and held in position by a single clamping screw.

This press is adjustable for either upright or inclined position, and so arranged that the front part of the bed is but slightly raised when inclined. To incline the press, the two rear screws which hold the legs to the frame are removed and the rear part of the press lowered, letting it rest on lugs cast on the legs for this purpose.

The machines are made in six sizes by the Toledo Machine & Tool Co., Toledo, O.



ADJUSTABLE OPEN-BACK POWER PRESSES.

For Uniform Boiler Specifications.

A meeting held recently in Philadelphia by the committee on uniform boiler specifications, appointed last year at the Philadelphia meeting of the American Boiler Manufacturers' Association, divided the work among four sub-committees, as follows:

1. Messrs. Hartley and Mitchell to take up the question of riveting, shop tests of rivets, drilling, punching, or punching and reaming rivet holes, and heads of rivets, caulking and hydraulic pressure; man heads and man holes, drums, domes, saddles, flanges, etc.; reinforcement and caulking.

2. Messrs. Hartley and Hammond: Methods of flanging, rolling, forming, bending and fitting plates.

3. Messrs. Riley and Meier: Qualities, tests, methods of rolling in, expanding, beading, taking out and replacing boiler tubes; also qualities, dimensions and methods regarding stay bolts, stay tubes, etc.

4. Messrs. Hammond and Meier: All questions relating to the supporting or hanging of boilers, bracing, etc.

Another meeting of the full committee will be held early in August to receive the reports of the sub-committees. Meantime boiler manufacturers, members of the association, are asked to send their views and the results of their experience to the sub-committees. It is desired that this be done by July 15. The addresses of the committeemen are as follows: H. J. Hartley, I. P. Morris Co., Philadelphia, Pa.; J. E. Mitchell, Atlantic Refining Co., Philadelphia, Pa.; George N. Riley, National Tube Works Co., McKeesport, Pa.; Richard Hammond, Lake Erie Boiler Works, Buffalo, N. Y.; Col. E. D. Meier, Heine Safety Boiler Co., St. Louis, or 120 Liberty st., New York.

At Birmingham, Ala., the Sloss Iron & Steel Co. and the Tennessee Coal, Iron & Railroad Co. advanced the wages of miners 2½ cents per ton July 1. This is equal to 7 per cent.

Review of the Technical Press.

Translation, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke.]

Basic Refined Steel in Continental Europe. [*Engineering*, June 17.]—Mr. C. E. Stromeyer discusses basic and acid steel processes in a paper read before the Institution of Engineers and Shipbuilders in Glasgow, Scotland. His observations in the steel making countries of Europe have enabled him to draw conclusions of interest and value regarding the relative merits of acid and basic steels. Mr. Stromeyer first discusses the various methods of making basic steel, giving the basic open-hearth, the basic Bessemer, and the basic refined, as he calls it, as the three typical processes.

In the basic Bessemer or Thomas process, the attainment of the melting temperature of steel has been found to result from the oxidation of the silicon rather than of the carbon, for a pure iron with carbon only blows cold. The silicon and carbon go off together, so that when the spectroscope reveals the departure of the carbon, the silicon will be gone also. Now comes the phosphorus, which will burn out when in the presence of a basic slag obtained by the addition of lime. As there is no way of observing when the phosphorus has been removed, the method adopted is to keep on the blast until the number of revolutions of the engine corresponding to the phosphorus contents have taken place, when the blast is stopped. The number of these revolutions is based upon the relation of the phosphorus contents to that of the carbon, and is determined by experience. Unfortunately the analysis of the metal before the blow does not always tally with the actual conditions, and so there may result a material either too high in phosphorus, or it may be oxidized by overblowing. Hence the bad name the metal has for boiler plates and ships. The rationale of the two types of the Bessemer process depends upon the silicon and phosphorus contents of the iron blown, and the nature of the converter lining. Thus, silicon unites with the oxygen of the blast before phosphorus, and goes into the slag by uniting with oxide of iron in the acid process, and with the lime and magnesia of the lining and the slag in the basic.

As the basic lining is expensive, the silicon in the basic process must be kept down, the carbon furnishing little heat, the phosphorus must be kept high. This is readily seen from the fact that the calorific value of carbon is 4,340 calories, silicon 14,000, and phosphorus 21,000. While these figures do not hold strictly for various reasons, it will be seen nevertheless that the phosphorus should at least equal the silicon, otherwise the charge would blow cold. Practice makes it 2½ per cent. Where this percentage of phosphorus is not available, melting in the open-hearth must be resorted to, in order that the fluidity of the blow be sufficient when the point of a mild steel is reached. In adding ferro-manganese a variety of troubles are encountered, as the silicon and phosphorus in the slag do not seem to agree very well. The addition of ferromanganese causes a change all around, the carbon and manganese thus introduced uniting with the oxygen of the phosphoric acid in the slag, leaving the phosphorus free to return into the steel. Hence the practice of either running off most of the slag, or else adding the ferromanganese in the ladle with the liability of an unequal distribution. The last stricture applies also to the basic open-hearth process, in which the metal has a better chance to improve in quality, as it takes nearly as many hours in this process as it does minutes in the Bessemer. To compare the basic with the acid open-hearth process, the first point to be noted is the volume of slag in the case of the former.

While the converter processes all waste iron, the open-hearth processes usually produce it, reducing the additional iron from the ores added. Theoretically, if the carbon, silicon and phosphorus of the charge should equal 5 per cent, the ore would add 15 per cent pure iron, making 110 per cent as compared to 95 per cent in the converter. This does not always hold good, however, as the silicon and carbon are partially removed before the ore is charged, for if the ore were introduced with the charge, in the acid process, it would attack the bottom and sides, and cause no end of trouble and damage. The acid process may therefore sometimes waste instead of produce iron. The basic open-hearth does not suffer from this trouble, the ore being basic as well as the lining of the furnace. It is possible to extract nearly every trace of carbon if desired, and a remarkably pure iron can be made. Here, also, the silicon should be low, and as it as well as the phosphorus require ten times their weight in lime, a great quantity of this material may have to be added. There are many difficulties to contend with in the basic open-hearth process. The lime dust will be carried into the air passages and eat out the silica brick. Thus Mr. Stromeyer describes an accident in which a few minutes sufficed to let the side of a furnace melt out, discharging the slag and steel, which took with them the cast iron columns and nearly wrecked the installation. The basic refining process is now taken up and explained as follows: The regular basic open-hearth furnace is used, the charge consists of, at most, 25 per cent pure pig iron, 75 per cent scrap, very little lime, and no iron ores. As the layer of slag is thin, the flame is relied upon to oxidize the carbon. Soon after the charge is melted it is refined to almost pure iron. The pig used is neither an acid nor a basic Bessemer variety, for it contains little silicon and little phosphorus. The only condition imposed is that the sulphur should be low, for this process does not remove it. The purity of the charge, to start with, and the small amount of lime slag required protect the iron from a rephosphorization when the ferromanganese is added. Mr. Stromeyer gives examples of steel made thus which ran less than .01 in phosphorus. The acid open-hearth requires pure scrap, but this basic refining process can admit of cold short material. The scrap must not be red short from sulphur, and as a matter of fact a cold short material is seldom red short, for if both it would never have gotten into the market. Where scrap is scarce, the question of making it regularly is now under consideration, and thus, strange to say, the puddling furnace may experience a revival. As only the silicon, sulphur and cinder need be removed, mechanical puddling will answer. At Witkowitz they make the scrap in small acid converters to remove the silicon, and run the molten steel into the basic refining furnace. This of course gives the furnace a long life. As a rule, steel is thus made in 10 to 20-ton furnaces, each heat lasting about six hours. The process is watched carefully and as soon as the impurities are all removed ferromanganese, or charcoal only, is added for recarburization, the heat well mixed, and tapped at once. In order to remove all the trouble due to oxidation the following method is sometimes resorted to. The metal in the basic refining furnace is heated to as high a temperature as possible and then poured into a ladle lined with silica, the ferromanganese being thrown in also. It is now let stand say a quarter of an hour, or even until the last moment before it must be poured, so that the carbon and manganese may unite with the remaining traces of oxygen and be expelled. The ingots are cast from the bottom and have every appearance of being solid to the top. While the process is suitable for both hard and mild steels, the latter variety is the one usually made with it. A number of tests are given which show the nature of the product obtained. The paper concludes with the statement that, while the two basic processes in the open-hearth are usually classified as one, there is a real difference between them, and that the product of the basic refined method seems to surpass even that of the acid steel furnace, which the author holds, is an indication of the availability of the process for further additions to the limits of tenacity and further reductions of scantlings.

THE next meeting of the Western Foundrymen's Association will be held on Wednesday, July 20, at 7:30 P. M., at the Great Northern Hotel, Chicago. The meeting will be devoted to a discussion of a paper by Herbert M. Ramp, entitled, "Trolley Systems in the Foundry," and a paper by E. H. Putnam, entitled, "Inspection of Castings," both of which were presented at the Cincinnati meeting of the American Foundrymen's Association in June. From those who are unable to attend the meeting, a written discussion of the papers is requested. Members are requested to send in questions relating to foundry practice, or reports of any experience or phenomena, which they may desire discussed, to the secretary for presentation at future meetings of the association.

BY an error the condensation in our issue of the 23d, of an article on "Steel Permanent Way" was credited to *Engineering News* instead of London *Engineering*.

INDUSTRIAL NOTES.

A $750,000 contract was awarded a few days ago to the Carnegie Steel Co., Ltd. It calls for about 25,000 tons of steel plate to be used on four ocean steamships now in course of construction by the Morgan Steamship Co. The Newport News Dry Dock & Shipbuilding Co. let the contract.

For the recent order of the B. & O. R. R. for 5,000 cars, placed with the Michigan-Peninsular Car Co., Detroit, the steel will come from a Pittsburg mill.

There is a report, which is not yet officially confirmed, that the Niles Tool Works Co., of Hamilton, O., has purchased the works and business of the Pond Machine Tool Co., Plainfield, N. J.

Negotiations are pending between the Westinghouse Air Brake Co. and the Boyden Air Brake Co., whereby the Westinghouse concern will become the possessor of the Boyden patents, and nine years of litigation will come to an end. The stockholders of the Boyden Air Brake Co. met at Baltimore and accepted a proposition for the sale to the Westinghouse Co. of the Boyden patents for $900,000.

The Elmira Iron & Steel Rolling Mill Co., Elmira, N. Y., went into a receiver's hands on June 15, 1897, not having funds sufficient to complete the steel department. The receiver was discharged June 14, 1898, and the company now has the plant, which, owing to other important interests, it desires to sell or lease. The mill has 17 puddling furnaces, one train of rolls, one squeezer, two engines of 300 horse power each, and two batteries of boilers. The steel plant consists of two 20-ton open-hearth furnaces. The merchant mill has a 9-inch guide mill, a 12-inch and an 18-inch train, a 22-inch universal plate mill and a 22 inch angle train.

The old Murray & Stevenson foundry and machine shops, Anniston, Ala., have been sold under a mortgage to the Smith-Kilby Co., a large dealer in locomotives and railroad equipments, who will operate the property. The company will overhaul and repair its own locomotives and equipments and do general foundry and machine shop work.

Eighteen carloads of structural steel shapes, for use in constructing power houses and substations of the Dublin Electric Railway Co., were shipped to Dublin, Ireland, last week by the Riter-Conley Co. The company has sent five of its men to superintend the erection of the buildings

The Laidlaw-Dunn Gordon Co., Cincinnati, received a large order for pumping and other machinery from Russia. Air compressors, air hoists and other air apparatus were included.

The Youngstown Bridge Co. made a shipment last week of 10 cars of bridge material—one-half of amount contracted for—to Cumberland, Md., where it is erecting a large bridge.

Furnace I of the Edgar-Thomson works, Carnegie Steel Co., has made an unprecedented run. It was blown in in 1890 and is still in blast. During this period it has made 881,000 tons of iron. The new Uehling casting machine is to be installed at this furnace.

Zug & Co., Ltd., of Pittsburg, signed the Amalgamated wage scale last week.

The Catoctin Furnace, near Thurmont, Md., will be sold at receiver's sale July 7.

Lake Superior Iron Mines.

President Wm. G. Mather, of the Cleveland-Cliffs Iron Co., has sent to the land agent of the company a new schedule of royalties, taking effect July 1, on all lands of the company which were thrown open some years ago to exploration under option or lease. The schedule heretofore has been nominally 30 cents for non-Bessemer ores, 40 cents for Bessemer and 50 cents for high grade Bessemer. The readjustment is in view of the lower level of prices now prevailing for iron ores and throughout the iron industry. A sliding scale is adopted, providing for a royalty of 7 cents a ton on the basis of $1.49 or less for a ton of ore delivered at Lake Erie ports; 8 cents a ton on ore selling at $1.50 to $1.59; 9 cents royalty on prices from $1.60 to $1.69; 10 cents on prices from $1.70 to $1.79; 11 cents on prices from $1.80 to $1.89; 12 cents on prices from $1.90 to $1.94; and so on, with 1 cent increase in royalty for each additional 5 cents increase in price. This make a 20-cent royalty on ore bringing from $2.30 to $2.34; 30 cents royalty on ore from $2.80 to $2.84, and 33 cents royalty on ore from $2.95 to $2.99.

It is reported that the Minnesota Iron Co. has recently leased three forties near McKinley, Minn., which in time may be an extension of the Elba mine. The fee of the property is owned by Petit & Robinson, of Minneapolis, who gave an option for a lease to Capt. Harry Roberts and George Howe, of Duluth, by the terms of which they were to receive 40 per cent of the profits to be derived from the operation of any mine found on the property. Messrs. Roberts and Howe then gave the Minnesota Iron Co. an option on the lease, the consideration agreed upon in case the lease was closed being $62,000. The mine has been taken on this basis. It is said to be the only case in which fee-owners have agreed to share in profits, instead of asking a fixed royalty.

The consideration stated in connection with the transfer of the control of the Biwabik mine from A. M. Byers and others to the Brier Hill Iron & Coal Co. and the Youngstown Steel Co. is $612,000. There have been two reductions in royalty since the original lease was made. The present royalty is reported to be 30 cents, the Williams royalty being 20 cents and that of the Lake Superior Consolidated Iron Mines, which holds the first lease, 10 cents.

Cuban Iron Mines and War Operations.

The dispatches from Cuba which announced the landing of American troops in the Santiago district, referred to the docks and other belongings of iron ore properties with which the iron trade is quite familiar. The steel pier and docks of the Spanish-American Iron Co. at Daiquiri (which most of the newspapers print "Baiquiri") are 19 miles east of Santiago, and were the landing place of most of Gen. Shafter's army. These docks and the mines inland with which they are connected by railroad, were illustrated and described in *The Iron Trade Review* in 1893, by Mr. S. P. Ely, who then represented the Spanish-American Iron Co. in Cuba. The mines of the Juragua Iron Co., which is composed chiefly of Bethlehem Iron Co. and Pennsylvania Steel Co. interests, are five miles nearer to Santiago, at Juragua, which has been prominently mentioned in the dispatches. The mines of the Sigua Iron Co., the Philadelphia company which has not operated its properties in the past three years, are seven miles east of Daiquiri, or 26 miles from Santiago. The Sigua mines are seven miles inland and a railroad connects them with Sigua Bay. The Juragua Iron Co.'s dock is at Santiago.

For the past two years the Spanish-American Iron Co.'s mines, docks and railroad have been operated under the protection of Spanish troops, by arrangement with the company. Just before the recent occupation of Daiquiri by American troops, the Spaniards burned the round house and shop of the company. These will be rebuilt at once and operations resumed, the company having several contracts on hand for the delivery of ore to furnaces in Great Britain.

THE three new battleships for which bids are soon to be called for by the Navy Department are to have the following dimensions: Length, 368 ft.: breadth, 72 ft.; mean draft, 23½ ft.; displacement, 11,500 tons; coal capacity, loose storage, 1,200 tons. The side armor is to have a maximum thickness of not less than 16½ inches, and an average breadth of 7 ft. 6 inches, extending from the stem to the after barbette and tapering from the maximum thickness over the engine and boiler spaces to a uniform thickness of four inches forward. The barbettes for the 13-inch guns are to have walls 15 inches thick except in the rear, where they may be reduced to 10 inches. The turret armor will be 14 inches thick. The sides from the armor plate to the main deck will be protected by not less than 5½ inches of steel armor, and the protective deck is to be 2¾ inches thick on its flat surface and from three to five inches on its slope. The power will be supplied by two vertical triple-expansion four-cylinder engines, driving twin screws. The batteries will consist of four 13-inch guns in barbette turrets, 10 6-inch rapid-fire guns in broadside on the main deck and four on the upper deck, and a secondary battery of 24 smaller rapid-fire and machine guns. There will be two submerged torpedo tubes. The vessel will be accepted from the contractor if her speed is 16 knots or more, but for speeds of less than 16 knots penalties will be assessed of $25,000 per quarter knot deficiency from 16 to 15½ knots, and $50,000 per quarter knot deficiency under 15½ knots.

The Lorain Steel Co.'s Blast Furnace Plant.

It is four years since the Johnson Co. decided to remove from Johnstown, Pa., and to become the manufacturer of its own steel. The search for the site at which materials could be assembled most economically for the manufacture of Bessemer pig iron, and the selection of Lorain, O., are well remembered. Cleveland was the original objective point, but its dock facilities were already overtaxed, and it had not the available land. To get plenty of land, and at the same time make sure of advantageous rail rates and ample and convenient dockage, the nearest eligible port to Cleveland was selected. The acquisition of 4,000 acres of land, the location of the steel plant about four miles from the mouth of Black river, and the beginning of operations on April 1, 1895, or less than 10 months after ground was broken, is familiar history. The original purpose, to build blast furnaces and by-product coke ovens and thus to secure the special advantages in low cost, that led to the selection of the Lake Erie site, has been held steadily in view from the beginning. As noted in these columns several weeks ago, a scheme of re-organization has been carried out, by which the Lorain Steel Co. was formed to take over the present plant of the Johnson Co. and to erect two blast furnaces, coke ovens and an additional blooming mill.

Work on the blast furnaces was begun in April and the expectation of General Manager Max M. Suppes is that the blast will be turned on in April, 1898—making a record for speed not less noteworthy than that in connection with the building of the steel plant. The engineers, Frank C. Roberts & Co., of Philadelphia, have provided a number of features calculated to work important economies; and in the past few years of waiting the management has had opportunity to develop plans that will not only take full advantage of all the special facilities afforded by the site, but ensure a practice fully representative of most recent advances. While it is to be expected that details of the plans now on paper will undergo some changes within the next ten months, it is possible to present below a general outline of the features to be embodied.

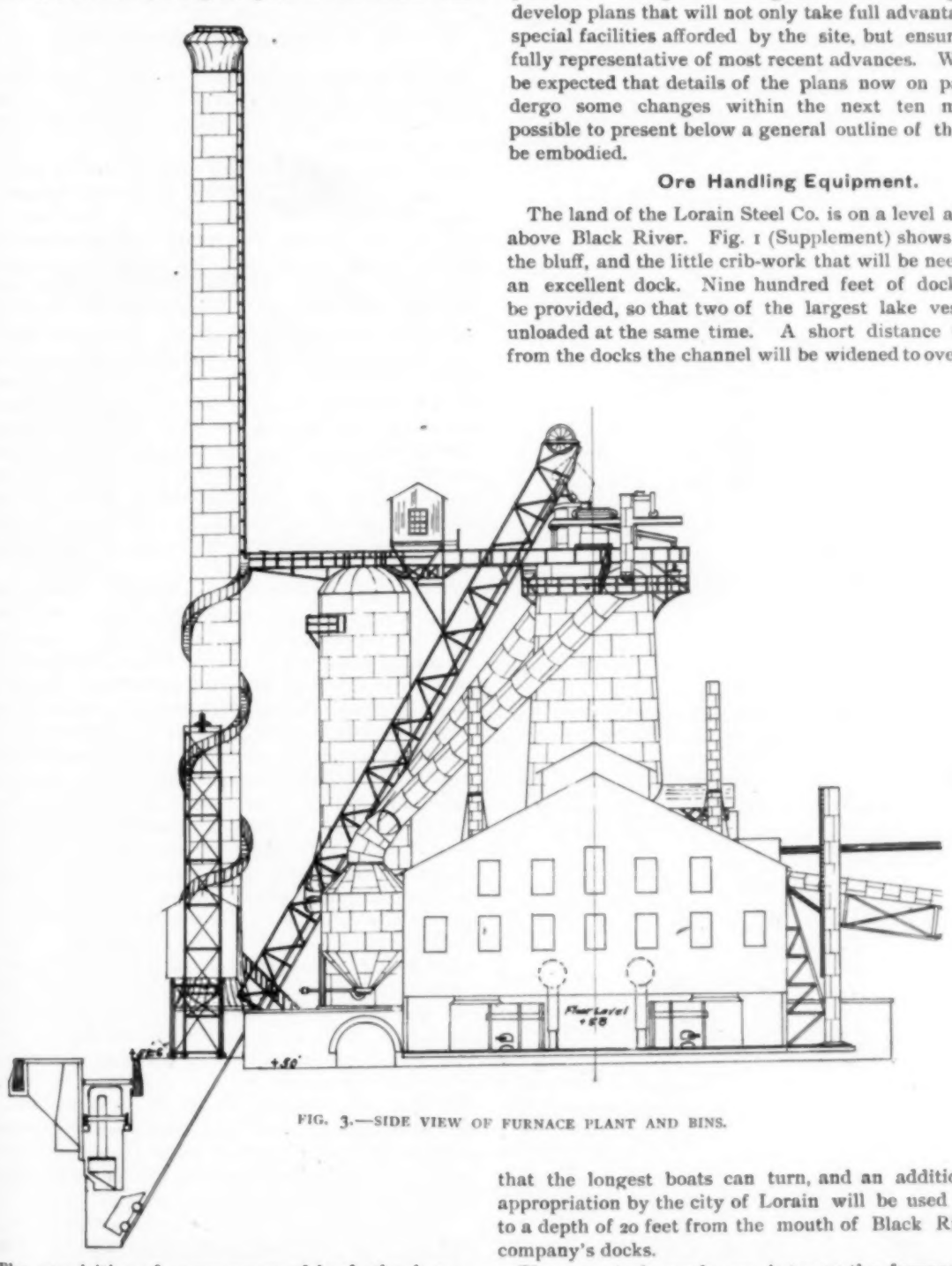


FIG. 3.—SIDE VIEW OF FURNACE PLANT AND BINS.

Ore Handling Equipment.

The land of the Lorain Steel Co. is on a level about 48 feet above Black River. Fig. 1 (Supplement) shows the line of the bluff, and the little crib-work that will be needed to make an excellent dock. Nine hundred feet of dock space will be provided, so that two of the largest lake vessels may be unloaded at the same time. A short distance up the river from the docks the channel will be widened to over 450 feet, so that the longest boats can turn, and an additional $75,000 appropriation by the city of Lorain will be used in dredging to a depth of 20 feet from the mouth of Black River to the company's docks.

The ore stock yards are between the furnace plant and the river. They will be commanded by eight hoisting and conveying machines, of the latest type. As seen in Fig. 1, the distance from the center of the hatches of a boat unloading at the dock, to the end of the hoisting bridge is 440 feet. The level of the ore yard is 48 feet above the datum, which is one foot above deep water level. The overhang of the hoisting bridge on the water side is 126 feet from the center of the pier at the top of the bluff.

Storage room is more than ample for all ore that will be used in the furnaces between Dec. 1 and the opening of navigation.

The track system planned for the ore yards is designed to secure the rapid delivery of ore at the bins (as shown in Fig. 2), and to take ore from the stockpiles during the winter season, with the smallest expenditure of labor. In the navigation season, ore for the current consumption of the furnaces will be loaded direct into cars on the tracks nearest the edge of the bluff, and conveyed to the tracks over the bins. Steel cars will be used, with a capacity of 55 tons, and trains will consist of 10 loaded cars. In the winter season, or whenever ore is desired from stockpiles, the cars will be loaded by Thew automatic steam shovels, recently described in these columns, an order having been placed for three of these machines, each capable of putting into cars 125 to 150 tons of ore an hour. The surface of the ore stock yard will require no expensive preparation. The clay soil will be overlaid with about a foot of cinder well compacted.

The ore bins, which stretch out for 620 feet between the ore yard and the furnaces are a unique feature. The shale formation underlying the four to six feet of surface clay makes a comparatively small expenditure for masonry necessary in the carrying out of the plan for underground bins. Sinking the latter below the surface puts the floor of the ore stock yard, the tracks over the bins, and the furnace yard

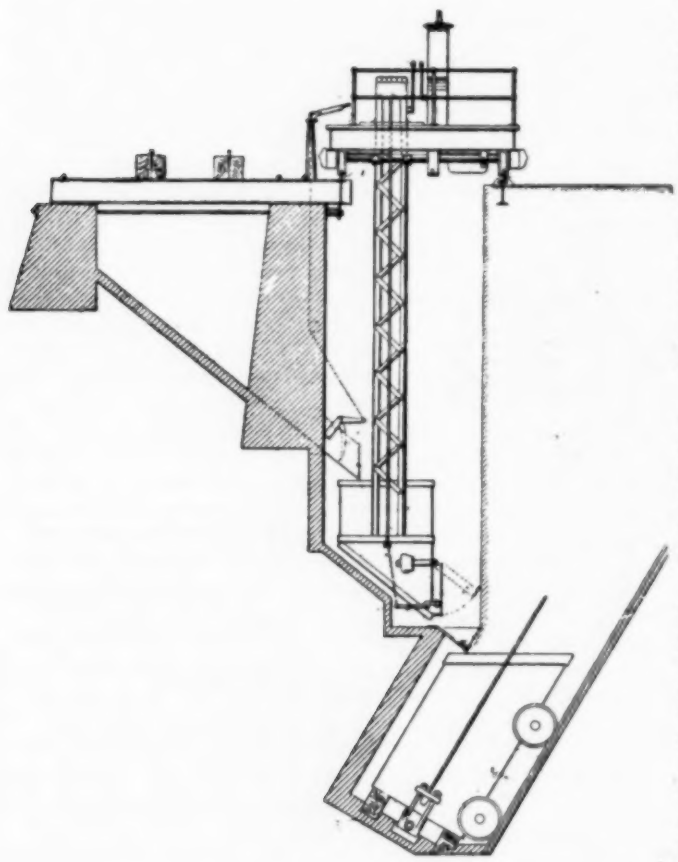


FIG 4.—SECTION OF STOCK BINS, CARRIER AND SKIP PIT.

substantially on a level. The shape of the bins is indicated in Figs. 3 and 4. They will be of steel construction, except the bottom, which will be of cast iron plates, 1½ inches thick, sloping at an angle of 45 degrees. The depth at the back is eight feet, and at the front 19 feet; distance between centers of supporting steel columns, 16 ft, 3⅜ in. The cast iron plates forming the bottoms of the bins will rest directly on the shale. One noteworthy advantage of the underground bins is the exemption secured from freezing of ore in the winter season. At Duquesne, where the bins are exposed on all sides, a branch pipe from the hot blast main is run under the bins to prevent freezing.

The ore carrier, seen in Figs. 3 and 4, runs in a continuous pit 10 feet wide and 30¾ feet deep. Fig. 4 is taken from the original patent drawing, in which the carrier ran on surface tracks. This has been modified, as in Fig. 3, so that the girders supporting the track are carried on a ledge six feet below the surface. The stock bucket is suspended by frame work from the weighing mechanism on the car platform. The discharge chutes of the bins—there being four to each bin, so that in case of scaffolding in one, the ore may be started through another—are opened and closed by the operator who sits in the car. The car is moved from bin to bin by electric motors. In filling the bucket a foot-lever is pressed by the operator, raising the door at the mouth of the bin-chute, by means of a chain. When the scale beam indicates to the operator that he has taken the requisite weight of the particular kind of stock in the bin, he releases the foot-lever and passes to a bin containing some other kind of stock. When the desired charge has been secured the car is moved opposite the skip pit shown, and the 8-ton skip, when it has received the contents of several buckets, is hoisted to the furnace top. There is a carrier for each stack, each carrier, as shown in Fig. 2, commanding 19 bins.

Furnace Stacks, Stoves, Etc.

The two furnace stacks will be equal in size to the largest yet erected in this country. The height will be 100 feet, and the diameter 14 feet in the hearth, 22 feet in the bosh and 15 feet in the throat.

The hearth jacket is 21 feet 1 inch at the top and 24 feet 6 inches at the bottom. There will be 16 6-inch tuyeres. Cooling plates will be of copper and set in flush with the inner wall. If it is desired the furnace may be re-lined later, to have a diameter of 23 feet. The shells will have an outside diameter of 31½ feet. The contents of each stack will be 27,400 cubic feet. Benezet brick will be used for lining. All foundation work is now completed. While the Black River shale furnishes excellent foundation, it was thought best, in view of the possible effects of heat upon the carbon in the shale, to excavate to a depth of 14 feet and build up with sandstone. The stack is carried on eight steel columns, 22 x 18 inches, 35½ feet high, and these rest on a circular bed of cast iron, each of its eight sections weighing nine tons. From the top of the stone foundation to the bottom of the hearth is 12½ feet, built up of No. 1 fire brick. From the top of the stone foundation to the center of the tapping hole is 13½ feet.

The hoisting incline will be a firmly trussed structure, rising at an angle of 60 degrees and carrying a skip of 225 cubic feet capacity, or about eight tons of ore. The skip travel in each trip will be 210 feet and an average of 15.75 skip loads per hour will be delivered at the top of the stack. The calculations as to materials are based on 188 drops of the bell per day, 94 for ore and limestone and 94 for coke.

Several features of the plans for top construction call for special mention. The top is closed by means of the usual bell and furnace hopper. A conical seal, made in six sections, is bolted to the top of the furnace hopper. It is provided with six 18 x 24-inch explosion doors, and having lugs with holes for the suspension rods. This seal prevents the escape of furnace gases when the bell is lowered for the purpose of allowing the charge to pass into the furnace, and the explosion doors provide for relief in case of emergency. The sections of the seal are bolted together and may be easily and quickly removed for renewal of the bell or hopper rings. Above the seal, carried by a truck traveling on girders supported by columns, from the furnace platform, is the distributing apparatus. The distributor consists of a hopper of sufficient capacity to hold the several maximum charges of coke, ore and limestone. The hopper is cylindrical, with flared top and built in two sections, one suspended from the beams of the truck, and carrying the bell, while the other section, a little larger in diameter, is arranged to rest on the top flange of the furnace seal, when stock is received from the skip.

This outside ring is lifted by a steam cylinder on the truck through lever and chain connections. The lifting of the ring allows the stock to drop from the hopper bell, which is suspended from the inner ring, to the furnace bell. The hopper bell being stationary insures equal space for the outlet of stock, and therefore even distribution. Ample clearance is allowed between the outer and inner rings of the distributor hopper, to insure free vertical motion. A ring, made in sections and provided with slotted holes, rests on the outer ring and permits adjustment, to conform to any irregularity or change of shape of either ring of the hopper, or any possible variation in the alignment of the track girders. This ring closes the space between the hopper rings and acts as guide when the outer ring is lifted.

Several important advantages are secured by this apparatus. It insures an even and uniform distribution of stock to the furnace bell and hopper, and therefore to the furnace; it effectually closes the top of the furnace and prevents the escape of gases; further, it meets the demand for a mechanism which will economically handle all stock at the top of the furnace.

One man will operate the distributing apparatus, as well as attend to the lowering of the furnace bell at the proper time, and to operating the skip hoist which delivers the material to the distributor hopper. This man is stationed in the hoist house, located over the inclined plane on which the skip travels and away from the heat of the furnace, in plain view of all mechanism which he controls. All stock is delivered from the bins by skip car, which automatically drops its load into the distributor hopper. A double Crane engine, 14 x 16 inches, will operate the cable for the hoisting car. It is provided with an automatic slowing-down device, which obviates the usual difficulty experienced by too sudden starting and stopping of the skip load.

On the same track girder which carries the distributor, and on rails outside of the distributor tracks, is a gantry crane of 20,000 lbs. capacity, which may be transferred to any position without interference with the top mechanism, and can be used for lifting readily any parts which in an emergency are required to be removed while the furnace is in operation, or in making repairs after the furnace is blown out.

The seal may be removed in sections and the distributing apparatus pushed quickly aside, at any time, and with a gantry crane to handle all parts of the bell and hopper of the furnace, it is reasonable to expect that the labor of making repairs will be reduced to a minimum. All parts are provided with eye bolts and lifting bars, for handling readily upon removal.

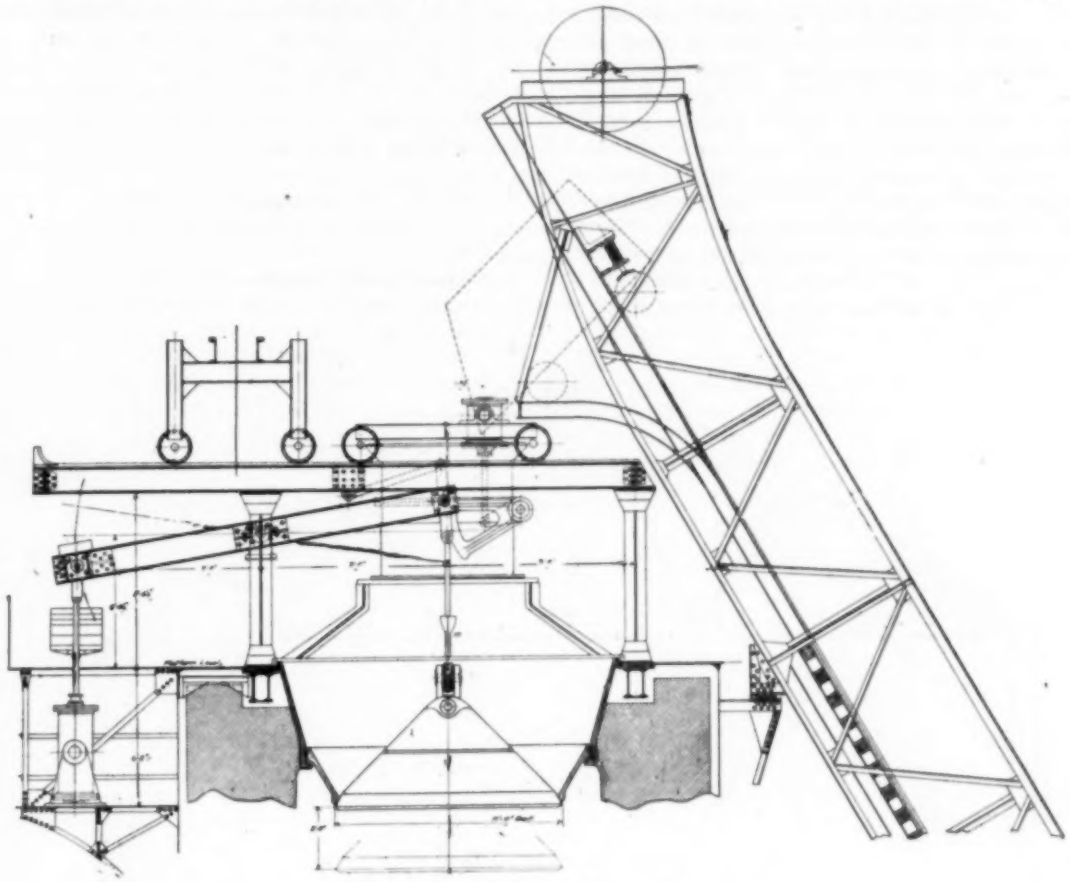


FIG. 5.—SECTION OF FURNACE TOP.

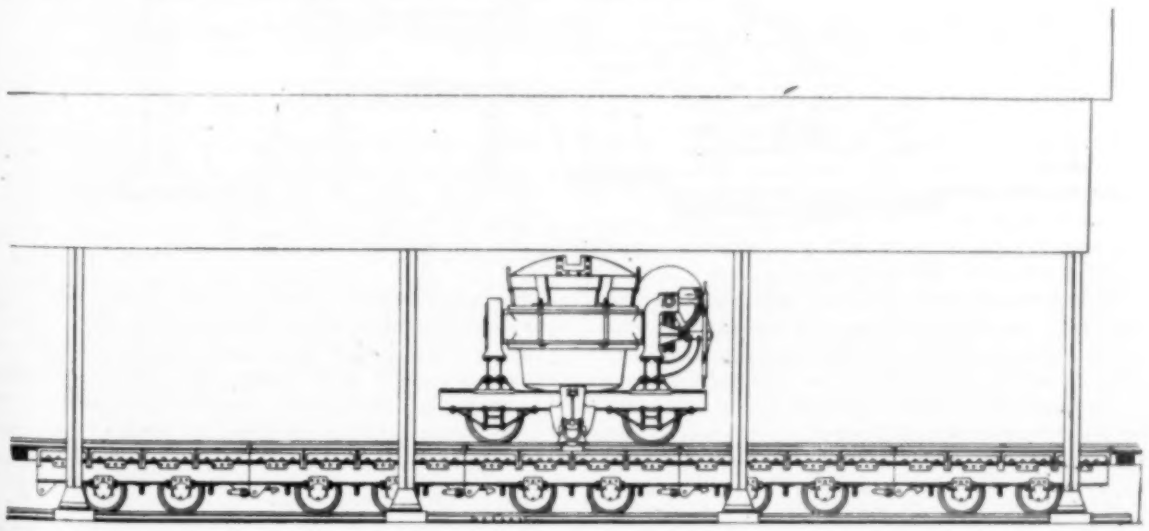


FIG. 6.—PIG IRON CASTING APPARATUS. SIDE VIEW.

Instead of the single down-comer, or one into which the gas is delivered through a number of branches, there is a bifurcated down-comer, the two branches connecting with the top of the stack on opposite sides, and merging just before passing into the dust catcher. In addition to the six explosion doors already referred to, there are six, three on each of the down-

comer connections with the top. Two of these are 30 x 30 inches and four are 18 x 24 inches. The angle of descent of the down-comer is 45 degrees.

The gas is conducted from the dust catcher to washing and scrubbing chambers, and a by-pass is provided so that the gas-washing plant is cut out in case of any interruption in its operation. The gas main to stoves and boiler houses is 75 inches in diameter.

There will be four stoves to each furnace, 100 feet high over all and 21 feet in diameter. The checker work is of Roberts special bricks, three inches in thickness and having openings nine inches square for the passage of the gases through the regenerator. Each stove has 45,000 square feet of heating surface. For the eight stoves there is one large stack, of riveted steel plates, whose position is shown in the plan view. A winding stairway gives access to the top of the stack and to a bridge crossing to the stoves and extending to the furnace platform. The tunnel shown in Fig. 3, immediately under the stoves, is an excellent feature. It extends underneath the whole line of stoves and a track will be constructed in it, on

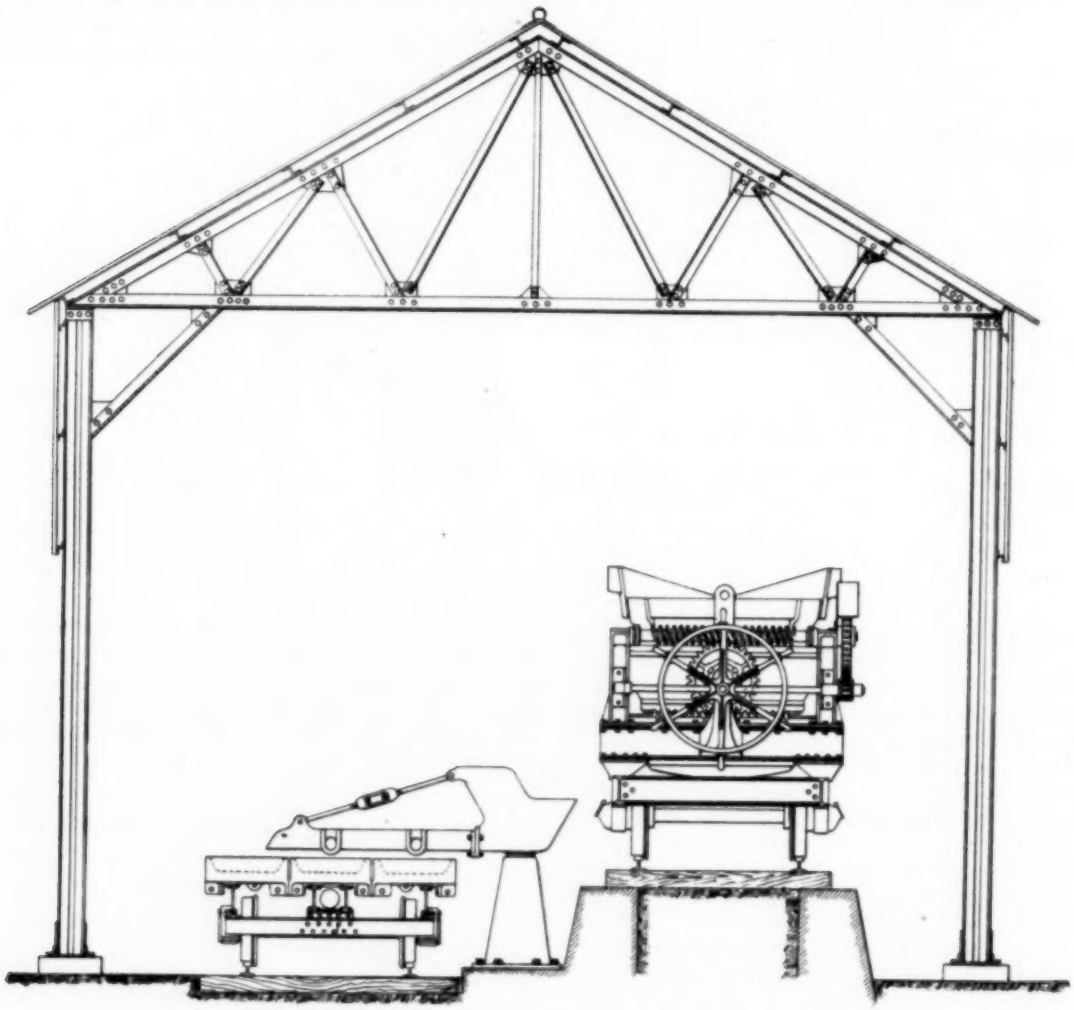


FIG. 7.—CASTING LADLE, TROUGH AND CAR—END VIEW.

which dust cars will run. As the dust accumulates in the pockets underneath the offtakes from the gas main to the stoves, it will be emptied into cars and drawn away with much less than the usual expense for labor. The tunnel also serves to conduct away the waste water from the stoves. It is 11 feet from the floor to the crown of the arch.

A house of steel construction, with roof and siding of corrugated iron, is provided for each furnace. This will be open on all sides to a height of 12 feet above the floor. It will be noticed that there is no provision for casting in sand. The space between the stacks is entirely open above. A unique apparatus for casting, where hot metal is not taken direct, has been devised, however, as referred to more in detail below. The cinder tracks will run in at the ends of the furnace enclosure shown in Fig. 2. The hot metal track will be parallel to a line running from center to center of the stacks, and the travel of the metal from the tapping hole to the ladle cars will be the shortest and most direct possible, and therefore attended with the least loss of heat.

Power House and Boiler House.

For each furnace there are two blowing engines, now building at the Southwark Foundry & Machine Co.'s works, Philadelphia. They are of the cross compound condensing type, with 44-inch high pressure cylinders, 84-inch low pressure cylinders, 66-inch stroke and 84-inch blowing tubs. The satisfactory experience with horizontal engines at the steel plant of the Company led to their selection for the blast furnaces. Each engine is capable of delivering 50,000 cubic feet of air a minute. At 45 revolutions a minute, 38,095 cubic feet can be supplied, giving a piston speed of 495 feet. At 60 revolutions, 50,794 cubic feet can be delivered, the piston speed being 660 feet. These engines can blow up to 25 pounds, giving ample leeway above ordinary requirements. If the necessity existed, a single engine could be used, for an interval, for one stack, so that more than the usual reserve is provided. The cold blast main is 48 inches in diameter and the hot blast main 50 inches.

The power house contains also the pumping and electrical plants. Provision is made for two Holly high duty horizontal pumps, and space is reserved for a third. They have 18-inch high pressure, 32-inch low pressure and 22-inch pump cylinders and 28-inch stroke. Each has an ordinary capacity of 7,000,000 gallons in 24 hours and is capable of running up to 10,000,000 gallons. There are also boiler feed pumps, two dry air pumps and two circulating pumps which serve the condensing plant. A 14 x 20 Southwark engine drives the Bibus rotary pump. The air pump is direct connected and is 22 x 20.

A Siemens-Halske generator of 300 kilowatts furnishes electrical power for the operation of the ore carrier which traverses the bin system, also power for a centrifugal pump located at the reservoir at the river side, mentioned below. A 65-light Brush dynamo is provided for the yard and dock lighting plant. It is driven by a Straight Line engine.

A single Weiss condenser located close to the power house, will serve for all condensation. Its capacity is indicated in the statement that it will condense the steam from engines developing 15,840 h. p., on a basis of 17 pounds of steam per

horse power per hour, when supplied with cooling water at a temperature of 70 degrees F. The amount of cooling water required is very low—13⅓ pounds per pound of steam condensed.

The boiler house is conveniently located with reference to the power house and the stacks and its site will be central, when two more furnaces are added in the future as is to be expected. There will be 6,000 h. p. of Cahall vertical boilers, the units being 250 h. p. each—four batteries of five each and two of two each. The boilers are 38 inches diameter each having its own steel stack 50 feet high. The steaming capacity of the boiler equipment affords a liberal reserve, and as additional boilers are needed they can be added, preserving the arrangement in batteries of five.

The Hydraulic System.

The same natural provision that afforded so liberal a supply of water for the steel plant, exists close to the side of the blast furnaces A ravine running down to the river was dammed to provide a 60,000,000 gallon reservoir for the steel plant. The ravine that is now being farther excavated to provide the blast furnace reservoir will store 30,000,000 to 40,000,000 gallons. The dam, which will be 48 feet above datum level, is now being built and the tunnel leading from the reservoir to the furnace site is well along. The pumping station, which will be located near the foot of the dam will contain two centrifugal pumps, furnished by the Southwark Foundry & Machine Co., of Philadelphia, and capable of supplying 3,000,000 gallons in 24 hours. The pumps will be driven direct by motors to which current is furnished from the electrical equipment in the power house.

Two wells, located just outside the pumping station, and shown in Fig 2, are on the line of the conduit. From one, water is pumped by the Holly pumps, which force it to the top of a 150-ft. standpipe, also shown. The standpipe is 12 feet in diameter. The supply pipe and outlet pipe are each 30 inches in diameter. The inlet pipe rises in the standpipe to a height of 15 feet. The other well furnishes water for the condenser plant. From the condensing plant the water is delivered to the purifying house, in which are filters, settling basins, etc., chemicals being employed to precipitate solids.

As the water passes from the purifying plant, so much as is necessary for the boilers is sent to the feed water heater plant of 3,000 h. p., located in the power house. All the remainder, as with all clean waste water, is returned to the dam. On the return, the water way is open, at intervals, so as to afford all possible opportunity for cooling. The hydraulic equipment promises to be particularly efficient and economical. The experience in connection with the steel plant has been that the loss of water is only equal to about one-eighth of the supply. This will probably be improved upon at the furnace plant, as the amount of water from the rolls in the steel mills, all of which is sent into the sewer, is very large.

Pig Iron Casting Apparatus.

Probably the most unique of the features devised by General Manager Suppes, and one that promises entire success in operation, is the provision for casting pig iron in chill molds. As noted above, there is no cast house at the furnaces. The usual practice will be to take direct metal, the distance from the furnaces to the converter building being 2,500 feet. On Sundays and at other times of suspended operations at the steel plant, the casting apparatus will be employed The casting shed will be located about midway between the furnaces and the converter building, and on the way the ladle cars will be run upon the track scales and weights taken. The ladles will hold 15 tons of metal each. Figs. 6, 7 and 8 give an excellent idea of the method of casting. The molds are of cast iron and are carried on small cars, weighing with mold about 10 tons. The ladle car, which, as shown, is run upon a track somewhat higher than that on which the mold cars stand, is stationary during the operation of pouring. The mold cars are made up in trains of five, that number being just sufficient to receive the contents of one ladle.

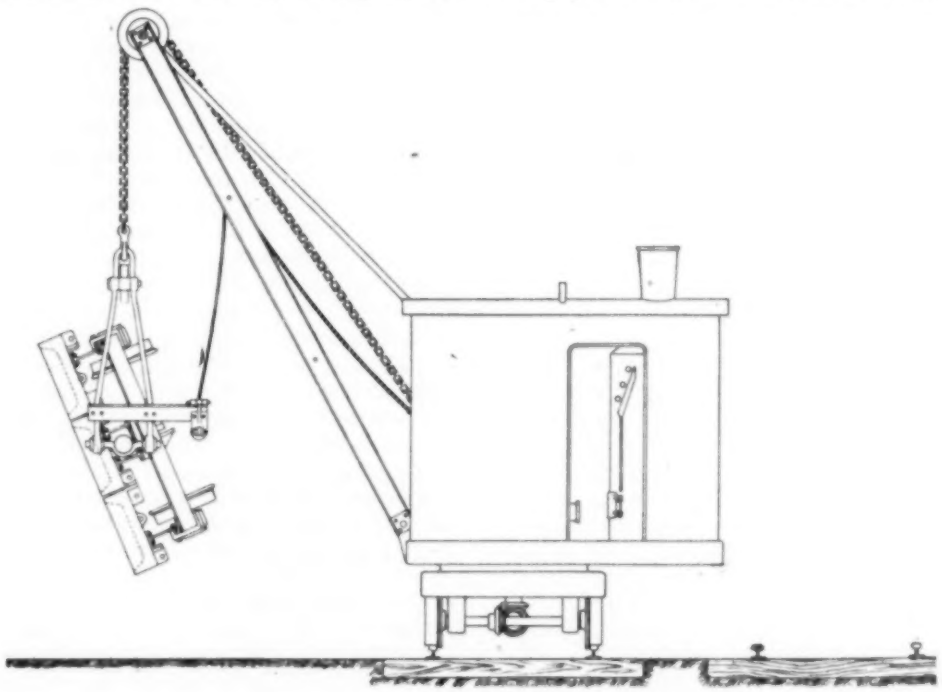


FIG. 8.—METHOD OF EMPTYING PIG IRON MOLDS.

They are pushed under the trough which receives the metal from the ladle, by a geared locomotive crane, the motion being exactly adjusted to the rate of discharge of the molten metal. There are three rows of molds on a car, each row having 20, making 60 pigs, or three tons of iron to the car. The edge of each mold overlaps the next one, so that there is no waste; and the end molds on each car overlap in the same way, making the series continuous.

The pouring trough, which will be mounted on a pedestal between the two tracks, will be made of Bessemer iron. As will be noticed, the molten iron is to be discharged in three streams—from the end, for the outer row of molds and from openings in the side for the other two rows. By the use of ganister, the size of these openings can be so controlled as to give a uniform supply of metal to each series of molds. The trough is supported on trunnions and is swiveled so as to swing from over the track, clear of the locomotive crane.

The molds will be made shallow enough, and with the angle of inclination of the sides sufficiently obtuse, to facilitate the removal of the pigs. The fact that the cars, after the pouring of the metal, are to be pushed upon a siding and ample time given for cooling—the molds not being kept hot by being used over and over again in the same cast, as with traveling chills—is counted on to obviate much of the difficulty experienced with sticking. It is expected, therefore,

that no mold-wash will be required. About three hours will probably elapse between the pouring and the emptying of the molds, ample time for the making of analyses to determine on what pile the iron shall be placed.

The method of emptying the molds will be novel and effective. After sufficient time has elapsed for solidifying and cooling, the cars will be taken to the storage yard, still nearer to the converter house, so that the movement is always in one direction. Each car in turn will be lifted clear of the track and dumped by a locomotive crane on an adjoining track. As shown in Fig 8 a steel harness is hooked to the arm of the locomotive crane. The harness passes under a pin at either end of the car, the pin extending into the side of the mold. As the car is lifted, the crane operator pulls a rope, drawing a trigger and allowing the car to turn nearly upside down, dumping its contents upon the pile.

By-Product Coking Plant.

Plans have been drawn for a plant of 240 by-product coke ovens adjoining the furnace site. The decision will soon be made as to the system which will be adopted, and work will then be pushed with dispatch. It is expected that a large percentage of Connellsville coal will be used in the manufacture of the coke.

THE MANUFACTURE OF STEEL CASTINGS.*

BY STEWART JOHNSTON.

France and Germany both claim to have been the producers of the first steel castings. France certainly made the first marketable open-hearth steel castings as early as 1870 at the Terre Noire Co. About the year 1861, steel castings were made by the crucible process by the Messrs. Vickers, of Sheffield, England, they operating under Reippe's patent, mention of which is made later. In this country, prior to 1870, a number of steel works made a few castings, but they were intended for their own use, and little thought was given as to their quality. A few attempts were made during the civil war to produce small field pieces of cast steel.

In 1870, William Hainsworth, a native of England and at that time a resident of Pittsburg, had constructed a small furnace capable of holding two crucibles, and with this small plant he made experiments until his capital was about exhausted. He had, however, been successful in producing a metal with that sonorous ring characteristic of steel, combining, too, the toughness and the malleability requisite. His efforts had been more particularly directed to the manufacture of the cutting parts of agricultural implements, and, with samples of these, he was not long in organizing a company, which was incorporated in March, 1871, at the same time erecting a plant in Pittsburg, which was the first American steel foundry. Up to about 1870 nearly all the steel castings were made by the crucible, or pot, process, including those made by the Vickers in England, as well as those produced on the continent; the molds for which were made by grinding up old clay crucibles, adding to this about 25 per cent of plumbago and a quantity of coal tar with clay wash to give proper temper. This, in short, is the Reippe patent.

Hainsworth in this country used ground coke, mixed with ground plumbago crucibles, German clay and all tempered with glue water, and on this mixture he took out a patent. The English crucible was made principally of a native clay, while in America the crucible is made of graphite from Ceylon. It will be observed that the composition of both the domestic and foreign mold contains much carbon, and this always affected the steel, inasmuch as the steel drew carbon from the mold, the result being a high carbon metal which was, after casting, hard and brittle. On the annealing furnace much was depended to reduce the casting to proper toughness and softness. It might here be stated that crucible steel castings of to-day are made comparatively soft without annealing by employing a large percentage of wrought iron in the charge, but in the early manufacture of these castings this was not the practice. In the latter part of 1874, Mr. Hainsworth had constructed by this company an open-hearth furnace, which, in 1875, was used in making steel castings, the first open-hearth furnace in this country to be so employed; and, in 1881, Hainsworth made Bessemer steel castings. For those iron foundrymen not familiar with the different ways of making steel, it might be proper to refer briefly to the methods, of which there have been seven employed, namely:

1. The direct method, as the Catalian forge.
2. The Finery.
3. Puddling.
4. Cementation process.
5. Crucible.
6. Bessemer, or pneumatic.
7. Open-hearth.

There are now but the three latter methods used in this country.

Reaumer, a French scientist, born at Rochelle, in 1683, is credited with being the first to employ the crucible in making steel. Huntsman, living in Sheffield, Eng., during the latter years of Reaumer, greatly developed the process.

The modern crucible furnace is constructed in a rectangular well shape, the top of which is usually at floor level. At either side of the hole, or furnace proper, are two chambers filled with open brick-work called checkers. Gas, generally used as fuel, is brought through one of these chambers and air through the other, the two uniting at and around the crucibles where the combustion takes place, the waste heat and products of combustion passing out and heating checkers in the two chambers on the other side. At stated intervals the direction of the exit and entrance of the air and gas is reversed. This method, as described, of bringing heated air to support the combustion of the heated gas, is known as Seimen's regenerative process. The top of the hole, or furnace proper, is made in a number of sections, which are removed to admit of putting in, or taking out, the crucible. The charge consists of about 100 pounds wrought iron, or steel clippings, with proper additions of manganese, silicon, or other ingredients, to insure solidity to the castings. The crucibles, after being filled, are covered with a lid of the same material as the pot, and the "puller out," as is called the furnace helper, by the aid of tongs, lowers them into the furnace. After from three to four hours the mixture is brought to the proper condition, and the "puller out" lifts the pots from the furnace, from whence they are carried to the molds and poured. Furnaces are built to hold from eighteen to thirty-six pots.

In 1856, Sir Henry Bessemer startled the civilized world by announcing that he could produce steel from molten iron without the aid of further fuel. The Bessemer, or pneumatic, process consists of placing molten iron in a converter, an ellipsoidal retort, and forcing air through the metal until the iron is decarbonized, as well as reduced in manganese and silicon. In nearly a horizontal position the converter receives the iron from the cupola, the blast is then turned on and enters through one end of the converter, which is then revolved 90 degrees into a nearly vertical position, the molten iron covering the tuyeres through which the blast is being forced. By the action of this blast through the molten metal a high temperature is developed by the combustion and oxidation of carbon, manganese and silicon; the heat thus developed being sufficient to maintain the charge in a state of fluidity. In fact, the temperature increases during the process until nearing the end. The iron, having been decarbonized, or converted into steel, then has added the spiegel and is ready for the ladle, from whence it goes to the molds. The Bessemer process is to-day substantially as first introduced, and unlike it, few inventions are at their inception so nearly perfect as to admit of but little or any improvement. A great number of patents on the method, or place, of introducing the blast have been taken out, and these various methods, or processes, usually bear the patentee's name, but they are but variations of the original idea of Bessemer, to whom due credit must be given.

The open-hearth process is but a development of older forms. The Martin process consisted of melting in an open-hearth furnace wrought iron with pig iron to produce steel; Siemens melted pig iron and iron ore; and these two methods were combined and furnaces constructed on the regenerative plan, to which reference has been made. This, in brief is the evolution of the Siemens-Martin open-hearth furnace as generally used today, and as first used in 1845.

More particularly it may be said that the furnace is usually

* Read at the Cincinnati meeting of the American Foundrymen's Association, June, 1898.

rectangular in shape, the center and upper portion of which is the hearth proper, which is supported on a structural bed, and beneath it are two pairs of regenerators. The gas under pressure and air are introduced through one set of regenerators, passing up through same, enters the hearth at one end, combustion taking place over the metal charge. The waste products of combustion passing through the other pair of regenerators, the exit of gas and air being reversed at regular intervals. On one side of the furnace are doors through which a charge of pig iron, steel or other scrap, and ore is thrown in to be melted, and on the other side is the tap hole. It will be noticed this process differs from the other two described, in that the flame comes in direct contact with the metal charge.

The first decade of the manufacture of steel castings in this country was not marked by decided advancement. Engineers in the constructive arts criticized and accepted steel castings at first with incrudility, it being urged that lack of uniformity existed, that many of the castings were machined with great difficulty, and indeed large proportions were rejected for their brittleness and hardness. Another objection militated against castings of the '70's was that they were not homogeneous, hard spots in castings were frequently noticed, not to mention blow holes. These castings, however, filled a long-felt want in supplying pieces that required a hard surface, such as dies and stampers, and parts of agricultural implements, as well as an infinite number of other uses.

Not, however, until in the '80's did the great stride in this branch of metallurgy begin to be noticed, when the manufacture of castings by the open-hearth and Bessemer processes becoming more and more general, the distrust with which the castings were first received became less and less. It was found that steel castings could be procured upon which the engineer had confidence, that the metal was soft and tough as wrought iron, yet greatly surpassing it in strength. Still the appearance of the casting was far from satisfactory; the proper material for a steel mold had not been used. The early steel foundrymen will recall the castings that came from the molds were so incrusted with sand, that the piece when shaken from the flask was with difficulty located, and only after digging away with picks and bars was the outline of the casting discernible. Then followed an expensive process of removing the sand. Annealing was then nearly universal, as in fact much was depended upon the anneal to remove the hard caked sand.

As the improvement in the metal was achieved through the better acquaintance with the requirements and through the aid of chemical research, so it became, after years, to be understood that steel at a temperature of 3,700 to 4,000 degrees F. required a different mold than cast iron at about 2,000 degrees F. A refractory material had to be obtained for the mold capable of withstanding the attack of the highest temperature known in metallurgy, and, although being impervious to the action of the fluid metal and free also from chemical reaction therewith, it must not be so dense as to prohibit the exit of gasses formed.

To Geo. Cowing, of Cleveland, O., is attributed the distinction of first making a mold for steel, much the same as is today used, of nearly pure silica, which material is first ground and mixed, and brought to the proper temper and adhesion by addition of glue water, molasses water, or flour water, and when made into a mold is generally faced with silica dust, or quartz ground to an impalpable powder. After having obtained the right sand mixture, precaution must be taken in ramming well the mold, for steel is so much more trying on it than iron that if this be lost sight of in the molding, scabbing can be expected, and can only be prevented by hard pounding of every part of the mold. The contraction of steel being nearly, and in some shapes quite, double that of iron, care also must be exercised in preparing molds that this excessive shrinkage is not interfered with, otherwise the much dreaded shrinkage crack, or "pull," will develop, but cracks and checks must not always be laid to the molding, as in many cases it is due solely to the treatment the steel has received in process of decarborization.

After successfully making the mold, it is taken to the oven and well dried; failure to thoroughly dessicate it is a frequent cause of pit holes, rough and scabby surfaces, while when rightly made and cared for will produce a casting that cleans with comparative ease, leaving a fine blue surface. Quite a number of light intricate shapes are now cast in green sand, it being less rigid enables pieces to be made that would check in cooling if made in a dried mold. Molds skin dried with benzine flash, or otherwise, are also common practice for such lighter shapes.

After casting, when care is taken to loosen the sand to admit of contraction and the piece allowed to cool in the sand, the rule is now general to omit the annealing, which some years ago was thought essential. More particularly to heavy sections it is a question whether annealing as often practiced is not detrimental. The Government still require all castings for them to be annealed, which operation the inspector may at any time witness. The Ordnance Department of the Government specifies the following physical characteristics must be obtained, if possible, in the No. 1 steel castings that are employed in the construction of gun carriages:

Ultimate tensile strength . . .	70,000 lbs. per sq. in.
Reduction of area at point of fracture	36%
Elongation in two inches	25%

A minimum toleration is:

Ultimate tensile strength . . .	60,000 lbs. per sq. in.
Reduction of area at point of fracture	30%
Elongation in two inches	18%

The uses to which steel castings are put are beyond enumeration and are daily becoming more varied, although at the time of their introduction in this country in the '70's their position in the commercial world was one of insignificance. Limited to a few lines, the production in first years did not annually exceed two hundred tons. Steel castings now invade every field in metallurgy, save the one occupied by the chilled iron roll when used for rolling finished steel, and for that purpose no steel cast substitute has ever been considered a dangerous rival.

It is estimated that the annual production of steel castings is from 80,000 to 100,000 tons in the United States. The reports of production of steel castings, as furnished to the American Iron and Steel Association, by those plants making ingots for rolling also, do not separate the tonnage of ingots and castings; hence it is to be regretted that the association cannot give statistics of castings exclusively.

In 1872 castings of plain sections, weighing 100 pounds, sold as high as 20 to 25 cents per pound, and not many years back the price for government work was 18 cents per pound for large plain sections, but, as the demand increased, so came the capacity for supply, the latter always considerably and of late years much in excess of the former, with the natural consequence that the average price of castings is down to about three cents per pound, while favorable shapes have been sold as low as two and one-half cents per pound.

The all-absorbing topic in these war times is the make-up of our navy, and it may be worth calling attention to the important factor steel castings play in the game of "hide and seek" enacted in the Caribbean Sea. A warship has the following principal parts made of steel castings: Stem, stern posts, shaft hangers, stern tubes, bow and stern chocks, riding, towing and mooring bits, anchor masts, anchor crane bearings, outboard bearings, thrust blocks, large engine bed plates, engine housings, sea chest connections, pistons, etc., etc.

These parts on a first-class battleship weigh about 500 tons, bearing in mind that this is exclusive of the gun mounts, and includes only parts of the engine and ship proper. The steel castings in a barbette carriage for a 12-inch gun weigh about 65,000 pounds. Among the first ships of our new navy to use steel castings were the Yorktown, Vesuvius and Baltimore, built by the Cramps, and the Atlantic and Dolphin, built by Roach & Son. Earlier boats used forgings, and this is but one of many instances where expensive forgings have given way to steel castings.

In 1887, Congress passed an act providing for the manufacture of three steel cast guns, for which bids were invited; the guns were to be made of crucible, Bessemer, or open-hearth steel. One of each Bessemer and open-hearth were supplied of six-inch caliber; the weight of each of these was approximately 11,000 pounds. The former failed on the second round, and the second was subjected to statutory test of 10 rounds of the highest explosive, and used in firing six-inch projectiles, 2,000 feet per second speed. The only defect claimed by the Government officials existing in the gun after firing was the expansion of the caliber, which measured by a Star gauge 7-1,000 of an inch.

Not a few steel foundries claim that the day is coming when steel cast guns will be made equal to the expensive forged and built-up guns. What was the result after firing the first built-up gun? Had experiments ceased then, what would have been the result?

COCHRANE SEPARATORS

"BLUE STEAM."

Ever notice the color, or apparent color effect, of a jet of steam issuing from a pet cock in a live steam main? Was it whitish? That was due to entrained moisture. The bluish color, or perfect transparency, is present only when the steam is dry.

Dry steam (it does not matter how wet it was originally) can always be had using a COCHRANE STEAM SEPARATOR. The mission of these appliances is to take water out of steam--to insure dry steam to engines, whether the steam comes ladened with a small quantity of moisture, or whether it is carrying a "flush" or a "slug" of water.

In our new Separator catalogue, which is fully illustrated, we detail something like 105 different sizes and constructions—building Separators to suit the conditions, being one of our hobbies. Postal requests will not be noticed.

HARRISON SAFETY BOILER WORKS,
(Columbia Station), PHILADELPHIA, PA.

ALSO MANUFACTURERS OF THE
COCHRANE HEATERS.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Novelty Iron Works, of Dubuque, Ia., have been incorporated to make castings, machinery, engines and mill supplies. The capital is $15,000.

The El Paso Foundry & Machine Co., El Paso, Tex., is asking prices on two 10-ton cranes to be operated by compressed air.

One second-hand No. 3 Gates crusher, or crusher of equal capacity, is wanted by the Warrior Machine Works, Birmingham, Ala.

The Florence Improvement & Mfg. Co., Florence, S. C., wants a lathe with swing not less than 22 inches and not less than eight feet between centers.

The Wellston (O.) Foundry Co. has made a successful start. It will make heater castings.

Articels of incorporation have been filed in Camden, N. J., by the North Penn Iron Co. The corporation will manufacture architectural iron work. The capital stock is $25.000 and the amount paid in is $5,000. The resident corporator is John Harris, of Camden.

The Springfield (O.) Architectural Iron Co. has been incorporated with a capital stock of $35,000.

T. Powell, J. H. Brown, P. S. Florea and others have formed a company at Connersville, Ind., capital $10,000, to manufacture harrows.

The Litchfield (Ill.) Machine Co., incorporated by S. M. Grubbs, George W. Amsden and E. A. Amsden, with capital stock of $50,000, will erect a plant for the manufacture of machinery.

The Titan Steel Co., Chicago, has been incorporated by Eugene E. Prussing, Frank H. McCulloch, and Edward Bernman. Capital, $500,000 It is reported that the company has been negotiating for the lease or sale of the Calumet Iron & Steel Co.'s plant at Cummings, Ill. There are 65 acres of land, with blast furnace, dock, steel plant, rolling mill, puddling furnaces, etc. Other reports connect the new company with an entirely new steel-making enterprise.

The plant of the Port Townsend (Wash.) Steel Wire & Nail Co. was sold by the receiver, June 18, to W. H. Hofius & Co., of Seattle, for $5,000. The new owners will operate it.

The Compressed Steel Co., of Newark, N. J., has filed articles of incorporation, to make and sell machinery for casting steel. Capital stock, $400,000, of which $1,000 is paid up. The incorporators are Henry Dickson and Peter Hassinger, of Newark, and Abram H. Ryan, Charles F. Spaulding, Frank R. Wickes and Arthur A. Richmond, of East Orange, N. J.

New Construction:—

James McKenna will erect a foundry at Joplin, Mo.

The El Paso (Tex.) Foundry & Machine Co. is erecting a new building, in which additional machinery and apparatus will be installed. An experimental concentrating plant for testing ores will be put in.

The Central Iron & Steel Co., Harrisburg, Pa., will rebuild the flanging plant recently burned.

Work has begun on the shops of the Western Maryland Road at Hagerstown, Md.

Plans are being prepared for a new three-story shop building, 350 x 50 feet, to be erected for Prentice Bros., manufacturers of tools and iron- working machinery, Worcester, Mass. The architects are Earle & Fisher, of Worcester.

The Pittsburg Bridge Co., Pittsburg, has been awarded a contract for furnishing the steel for the addition to the power house of the Metropolitan Street Railway, at Center ave., Chicago. The approximate cost will be $30,000.

The Syracuse Construction Co., of Syracuse, N. Y., is erecting new buildings in connection with its electric railroad plant. The buildings consist of a boiler house 60 x 90 feet, which is an all fireproof building, having steel framework

The Q & C

Shop Saws

Cut Everything. - - - -

No. 1. Capacity, 4 inches.
No. 2 " 5 "
No. 4. " 8 "
No. 8. " 3x12 "

POWER SAWING MACHINES

For all purposes.

THE Q AND C

Chicago. New York.

Send for Catalogue.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick

GOVERNMENT ‡ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—**MOUNT SAVAGE, Alleganv County, Md.**

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Ferguson Block, Pittsburgh, Pa., Stowe, Fuller & Co., 195 Merwin St., Cleveland, Ohio.

OTIS STEEL

"OTIS" FIRE-BOX PLATES A SPECIALTY.

Flange Plates, Ship Plates, Tank Plates, Steel Car Axles and Forgings of all kinds.

Steel Castings from 100 to 75,000 lbs.

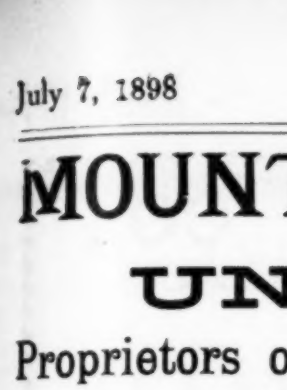
Head Office and Works, CLEVELAND, OHIO.

Agencies: NEW YORK, 97 Cedar St. CHICAGO, Old Colony Bldg.
ST. LOUIS, 516 N. Third St. WASHINGTON, Kellogg Bldg.
MONTREAL, J. G. Sibbald, 3 Windsor Hotel.
SAN FRANCISCO, John Woodlock, 26 Beale St.

RICE MACHINERY CO., 166-174 South Clinton St., Chicago.

Engineers, Founders and Machinists.

Telephone 4448 Main.



The DODGE American System of ROPE Transmission. Complete Plants Furnished. Try Indurine.

Shafting, Hangers, Friction Clutches. Elevator, Brewery, Sugar Refinery and Oil Mill Machinery, Belting and Mill Supplies.

GENERAL AGENTS FOR THE DODGE INDEPENDENCE WOOD SPLIT PULLEYS.

covered with corrugated iron on the sides and roof. There is also an engine room 65 feet wide by 80 feet long, having a steel framework and brick sides. The other building is a car barn and repair shop 65 feet widde and 170 feet long. This building also has steel framework construction, with corrugated iron sides. All these buildings have been designed and are being erected by The Berlin Iron Bridge Co., of East Berlin, Conn.

Work is being pushed on the new Dresden, O., sheet mill. The Cambridge (O.) Foundry Co. has nearly completed its part of the contract. Harry Ashton, formerly roll turner with the Cambridge Iron & Steel Co., is active in the enterprise. The plant will consist of two sheet mills to begin with.

The C. H. Dutton Boiler Co., Kalamazoo, Mich., is erecting a large foundry. The ground floor will be 60 x 120 feet, one and two stories high; the pattern house will be 18 x 36 feet.

Architect J. W. Tate, 99 Stephenson st., Freeport, Ill., has prepared plans for a foundry building, for the Stover Mfg. Co., of that city, to be 75 x 125 feet, two stories high, built of brick. Cost, $10,000.

The Monessen Foundry & Machine Co. will build a plant at Monessen, Pa., the new town on the P. & L. E. Railroad.

The new machine shop just completed by the Gates Iron Works, Chicago, is one of the best shops in the country for heavy work. It is of steel and brick, 80 x 365 feet, has a 30-ton traveling crane, and is fitted with many new tools, including a 10 x 22 foot planer.

At Richmond, O., Jaynes Bros., machinists will erect a machine shop.

The Riter-Conley Co., Pittsburg, has been granted a permit for the construction of an additional erecting shop. It will cost about $12,000. Increased business has made it necessary.

At Atlantic City, N. J., the building of the new bridge over

U. BAIRD MACHINERY CO.,

123-125 Water St., **PITTSBURG, PA.,** 124-126 First Ave.

Machine Tools and Supplies. Send for list of Second-hand Tools.

McDOWELL

SEMI-STEEL

PROCESS.

(Cupola metal.) Government tests 36,000 to 49,000 tens. strength.

HANSON McDOWELL,
1522 Monadnock. Chicago.

A B C OF IRON,

NOW $1.00.

Kirtland C. Gardner, M. E.

GENERAL
DRAUGHTING
AND
DESIGNING.

Address
415 Sibley St.,
CLEVELAND, O.

Improved Machine Tools

FOR USE IN

Bridge and Structural Iron Works. Boiler and Tank Shops

Are illustrated in our NEW CATALOGUE "O." Send for it.

Double Angle Shear, motor driven.

HILLES & JONES COMPANY,
908 Church Street,
WILMINGTON; DELAWARE.

N. B.—Send for list of Machine Tools on hand for quick delivery.

PUNCHES AND SHEARS

OF ALL KINDS

MANUFACTURED BY

The Long & Allstatter Co.,

HAMILTON, OHIO.

Send for catalogue.

SHENANGO VALLEY STEEL CO., New Castle, Pa.,

MANUFACTURERS OF

Bessemer Pig Iron, Steel Billets, Blooms, Black Plate, Tin Plate, Tin Plate Bars, Wire Rods, Market Wire and Wire Nails.

the Tuckahoe River was awarded to the Pittsburg Bridge Co. The bridge will have a total span of 117 feet. The draw will be 44 feet and the driveway 14 feet wide.

The American Steel Barge Co. will begin soon the erection of a power house at West Superior. The length of the slips is to be increased and other improvements made which will cost about $50,000.

At Manitowoc, Wis., the Goodrich Transportation Co. will erect a new machine shop. The boiler shop is to be converted into a foundry.

At Monmouth, Ill., the Iowa Central will erect a repair shop 40 x 40 feet.

The Cudahy Packing Co. will build a shop at Sioux City, Ia., for the repair of its refrigerator cars. It will be 150 x 100 feet.

Fires and Accidents:—

The foundry and machine departments of the Watsontown (Pa.) Mfg. Co. were recently destroyed by fire.

Fire in the Petersburg Iron Works foundry, Petersburg, Va., caused a loss of $4,000.

Additions, Enlargements, Removals, Etc.:—

Bids are being received for a two-story extension of 64 feet to the ordnance machine shop of the Midvale Steel Works, Nicetown, Philadelphia, Pa.

A skelp mill will be added to the Belmont plant of the Wheeling Steel & Iron Co. Machinery formerly in use at the Brilliant, O., mill has been purchased.

Negotiations are on for the removal of the Woodcock Foundry & Machine Works, of Chillicothe, O., to Roanoke, Va.

The Kansas City Bolt & Nut works are erecting two new gas producing furnaces and a rolling mill, occupying a space 250 x 120 feet. A shear weighing 95,000 pounds will be added. These improvements will double the output and increase the number of men from 250 to 500.

The Coe Brass Co., Ansonia, Conn., is building an addition.

The Rock Island (Ill.) Plow Co. has made plans for the extensive enlargement of its plant.

The King & Andrews Co., manufacturer of semi-steel machinery castings, Chicago, has removed to its new foundry at Chicago Heights. The new plant is much more extensive than the old one, and the greater part of the machinery is new and of the most approved pattern.

The foundry of James E. Thomas, Newark, O., is being enlarged.

The Phœnix Foundry & Mfg. Co., Lansdale, Pa., is building an addition to its foundry. The annex is 75 x 150 feet. The additional structure will furnish room for the manufacture of a larger variety of pipe and fittings and other sanitary specials.

The Pennsylvania Steel Co. is extending its bridge and construction department. A large drawbridge for Boston is being pushed to completion.

INLAND IRON & FORGE CO.,

Marquette Building, CHICAGO, Manufacturers of

BAR IRON AND STEEL,

Angles, Channels and Special Shapes for Car, Carriage and Wagon Work.

Iron and Steel Car Axles and Forgings.

Works, EAST CHICAGO, IND.

(Formerly owned by East Chicago Iron & Steel Co.)

Conestoga Building, EDWARD E. ERIKSON, PITTSBURG, PA.

Regenerative Gas Furnaces and Water Seal Gas Producers.

Producer Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

The A B C of Iron, Now 81.

General Industrial Notes:—

The Greensboro (N. C.) Furnace Co.'s property has been bought by W. H. Houghton, of New York, who will put the furnace in blast.

The three triple expansion crank and fly-wheel pumping engines to be built by the Lane & Bodley Co., of Cincinnati, for the water works of that city, will be the largest ever built. They will have a capacity for pumping 30,000,000 gallons per day each. Each engine will weigh 1,414 tons.

The Stilwell-Bierce & Smith-Vaile Co., Dayton, O., reports satisfactory trade in triplex pumps. Its Chicago house recently received an order for two pumps, with a combined capacity of 3,000,000 gallons in 24 hours, from the Alpena Water Co., Alpena, Mich.

The American Road Machine Co., Kennett Square, Pa., has shipped a carload of road machines, rock crushers, engines, road rollers, etc., for the United States Government, which, it is stated, are to be used for road building in Cuba.

The Lane & Bodley Co., Cincinnati, has an order for a 250-horse power engine, with shafting, pulleys and other attachments for R. K. LeBlond's new plant in Linwood, O.

The Dover (N. J.) Iron Co. has put in a 400-horse power vertical engine and a new train of 20-inch rolls, capable of rolling large sizes of both flat and round merchant iron.

The Pawling & Harnischfeger Co., Milwaukee, has taken a contract through W. C. Beach, its Pittsburg representative, from the Ætna-Standard Iron & Steel Co., Bridgeport, O., for six cranes, ranging in capacity from 15 to 20 tons each.

Car and locomotive building: Of the 2,000 box cars of 80,000 pounds capacity recently ordered by the Pennsylvania Road, 400 went to the Milton (Pa.) Car Works, 600 to Jackson & Woodin, Berwick, Pa., 500 to Terre Haute (Ind.) Car & Mfg. Co., and 500 to Altoona. The Grand Trunk has placed an order for 500 freight cars with Wells-French Co. The St. Louis & San Francisco is ordering 300 freight cars. The Michigan-Peninsular Car Co. has an order for 300 box cars from the Minneapolis & St. Louis. The same company has an order for 100 flat cars and 50 box cars from the Detroit & Mackinac. The St. Charles Car Co. has a contract for 200 box and 50 coal cars for the St. Joseph & Grand Island. The Baldwin Locomotive Works' New Zealand order for locomotives has been increased from 10 to 20. The L. & N. has ordered 15 consolidation locomotives from the Brooks Locomotive Works.

The Ohio Steel Co., Youngstown, O., has awarded the contract for three blowing engines for its new blast furnace plant to Wm. Tod & Co., of Youngstown. The engines will be of the vertical steeple, cross compound condensing type. The steam cylinders will be 54 and 102 inches in diameter and the stroke 60 inches. The fly-wheels will be 24 feet in diameter. The engines will be capable of blowing to 25 pounds air pressure.

The Morgan Engineering Co., Alliance, O., made the lowest bid on 19 12-inch disappearing gun carriages and 6 8-inch carriages for coast defences, the bids being opened July 2. It is expected nearly all the work will go to the Alliance company, the time of delivery requiring a division of the contract.

The Walker Co., Cleveland, has been very busy of late on Government and electrical work. For a portion of the time the entire plant has been running double turn. The gun carriage work for which a large contract was taken, is being inspected by Capt. Gibson, representing the Government. Some unusually large generator work has been under way. At present the company is engaged on a 2,700 k. w. generator for the Boston Elevated Railway. It will be capable of 50 per cent overload and is the largest generator ever built for this work. In the past six months the plant has been engaged on three large generators of 1,600 k. w. each, two for Brooklyn and one for New York, the latter driving both an electric and a cable road.

At the recent annual stockholders' meeting of the American Steel Casting Co., at Jersey City, N. J., the following officers were elected: Daniel Eagan, president; Wm. M. Wilson, vice-president, and John W. Booth, of Thurlow, Pa., secretary and treasure. The company's plants are at Thurlow, Pa., Sharon, Pa., Pittsburg, Pa., Alliance, O., Syracuse, N. Y., and Norristown. All are in operation excepting the last two

The Case Mfg. Co., Columbus, O., has lately taken the folowing contracts: The Reeves Iron Co., Canal Dover, O., for a 15-ton electric three-motor crane; The National Electric Co., of Brooklyn, N. Y., for a 92-ft. span 25-ton crane; The Dayton Globe Iron Works, Dayton, O., for an 8-ton hand-power crane; The Bullock Electric Mfg. Co., Cincinnati, O., for a 20 ton electric crane, and Dresden Iron & Steel Co., Dresden, O., for a 15-ton crane. These sales have all been made within the last month or two. It has also lately put into operation the following: Two 10-ton and one 15-ton electric 3-motor traveling cranes for the Laughlin Iron Works, Wheeling, W. Va.; one 15-ton crane for the Johnstown Tin Plate Co., Johnstown, Pa.; one 15-ton electric traveling crane for the Old Meadow Rolling Mill Co., Scottdale, Pa.; one 10-ton electric crane for the Lewis Foundry & Machine Co., Kansas City, Kan., and two 30-ton electric traveling cranes to ship to Sidney, New South Wales.

Everett Furnace, at Everett, Pa., has been put in blast after extensive alteration.

No. 7 furnace of the Lock Ridge (Pa.) works of the Thomas Iron Co. will be blown out. The furnace has been working well, but the market does not warrant continued operation.

The Illinois Steel Co., through Assistant Superintendent Charlton, acting in the continued illness of Supt. Reis, signed the Amalgamated scale for its Bay View mills.

The annual meeting of the stockholders of the Bethlehem Iron Co. was held at Bethlehem, Pa., June 29. There were 81,461 shares of stock represented, their value being $4,073,050. President Linderman's annual report was accepted, and the following board of directors was elected: R. H. Sayre, Sr., Joseph Wharton, E. P. Wilbur, R. P. Linderman, Beauveau Borie, J. B. Lippincott and R. W. Davenport. The board

organized by re-electing R. P. Linderman president; R. H. Sayre, Sr., first vice-president; R. W. Davenport, second vice-president; C. O. Brunner, treasurer, and A. S. Schropp, secretary.

A recent stock market report on Colorado Fuel & Iron Co. says: "The operations of the new steel rail mill have been very satisfactory. Last year's fuel business was the best the company ever had, and it had a market most of the time for all of the manufactured iron it could produce. It has no opposition nearer than Chicago, and therefore has what could be called a differential on the price of all of its steel products. Its market is very wide, and, in view of the prosperity of that section of the country, consumption of iron is large. The mill started with orders for rails sufficient to keep it busy until late this autumn. It can make rails as cheaply as any plant in the country, and can get a better price for them than any other concern. If the demand for rails falls off, the mill is equipped to make structural steel. The securities have been very dull ever since the dividend on the preferred stock was interrupted in order that this steel mill should be built."

The British Government has accepted the bid of the Weber Gas & Gasoline Engine Co., of Kansas City, Mo., for building cable hoisting machines to be used in British Guinea in raising telegraph cables. Six of these machines are to be built and will cost about $20,000.

The Ætna Foundry & Machine Co., Warren, O., has been busy recently on orders for tinning machines, tables, rolls, guides, etc., from the Monongahela Tin Plate Co., and the Shenango Valley Steel Co., and for doubling shears for a Wheeling plant.

The wash metal plant of the Youngstown (O.) Steel Co. is in operation and is turning out a fine grade of iron.

The Finished Steel Co., of Youngstown, O., shipped 350 tons of its polished shafting last month. This is the greatest amount ever shipped in any one month by 65 tons since the company started in business.

Advices from London state that the £500,000 capital of the American Association, which holds all the shares of the Middlesboro (Ky.) Town and Land companies, has shrunk to the market value of £62,500. The company has a great many assets, and in 1892 the shares were at a premium. The Watts Steel & Iron Syndicate, Ltd., which owns blast furnaces and a steel plant at Middlesboro, is one of the connected enterprises of the general company.

The Reading Co. has increased its forces at all repair shops.

Messrs. Ogden and Schofield, of Philadelphia, have purchased the foundry of Oliver Hallman, at Mont Clair, opposite Phœnixville.

SUMMER IN COLORADO.

Special Tourist Tickets via Pennsylvania Lines.

Colorado is particularly inviting as a summer haven. The climate is remarkable for its invigorating effect, and the State is rich in grand scenery and points of interest where a vacation may be pleasantly spent. Special arrangements are being made for the entertainment of visitors who are this season expected to be attracted to the seclusion and quiet of the Rockies and the hills and canyons of that great wonderland.

Colorado to-day is nearer home than in former years. The fast schedules of the Pennsylvania Route and connecting lines bring the Centennial State within easy reach, and the cost of a trip thither is no longer a luxury. The special low rate Tourist Tickets over the Pennsylvania Lines places the cost for transportation within the limit of the usual allowance for vacation trips. For special information about rates, time of trains and other details please apply to nearest Pennsylvania Lines Ticket Agent, or address C. L. Kimball, A. G. P. Agent, Cleveland, O.

Important Notice.

The C. T. & V. R. R. in connection with the C. & M. Ry. now operates two trains daily (except Sunday) between Cleveland and Canal Dover, Newcomerstown, Cambridge, Marietta, and Parkersburg. Leave Cleveland 7:15 A. M., solid through trains to Marietta without change, arriving at Marietta at 3:10 P. M. Leave Cleveland 11:00 A. M. Arrive at Marietta 7:30 P. M. For rates and further particulars call on agents or address,

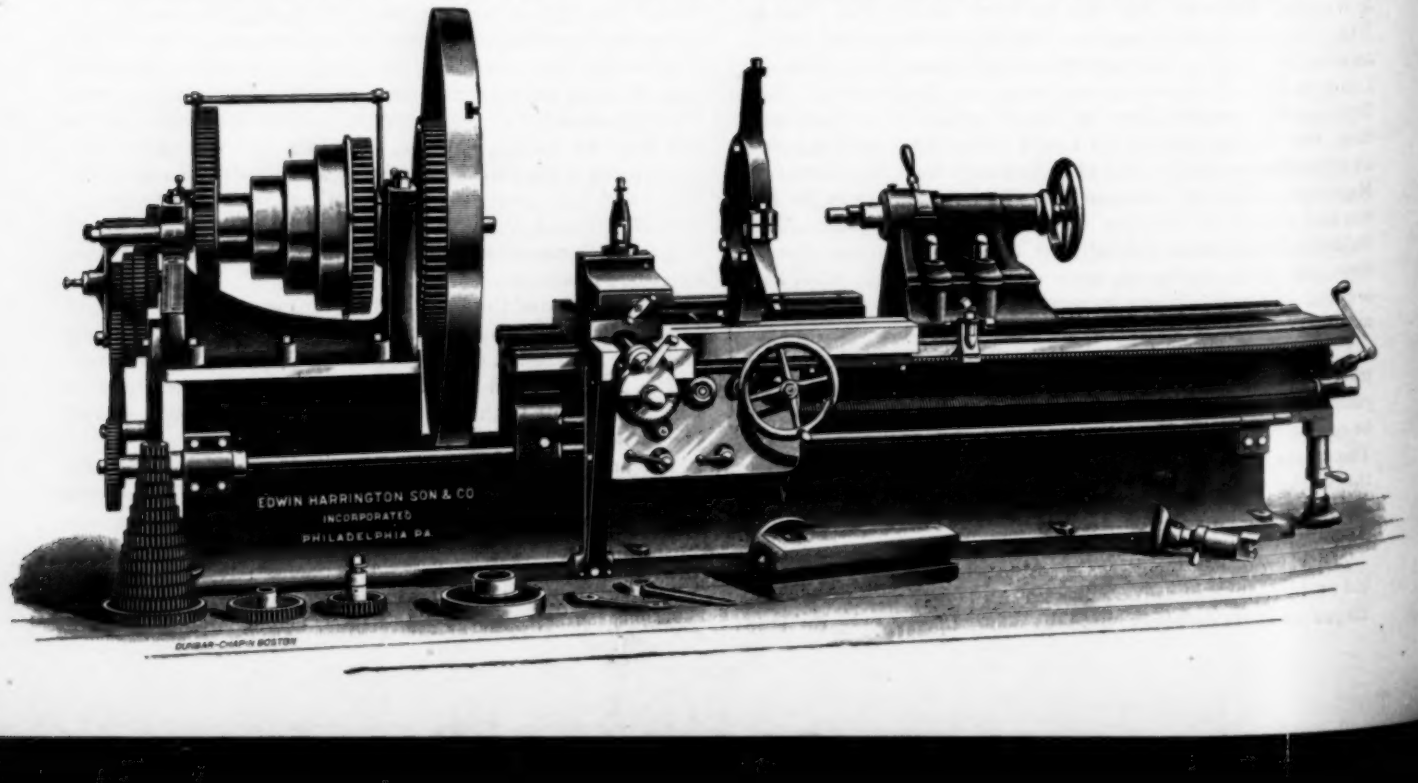
J. E. Galbraith, Traffic Manager,
C. T. & V. R. R., Cleveland, O.

EDWIN HARRINGTON, SON & CO., Inc.,

1526 PENNA. AVE., PHILADELPHIA, PA.

Designers and Manufacturers of MODERN MACHINE TOOLS.

EXTENSION LATHES: Strong, Handy, Powerful. Bed Opens to admit work of Large Diameters.

DRILL PRESSES, MILLING MACHINES,

ELECTRIC AND HAND-POWER HOISTS.